

Montana

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One Dollar

Outdoors



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THE COVERS: In the Oct./Nov. 1979 issue of *Montana Outdoors*, Russell Chatham described fall in the northern Rockies: "September can be, and often is, a stormy month....when a full-scale snowstorm happens early in September, visitors understandably make a run for it. But then, with luck, early October brings with it those last velvety days when vision only begins to fail behind bluish haze at distances of a hundred miles or more, days heightened in beauty by the simple fact that within hours they may be gone for another year." His description of these "cherished" days is aptly portrayed on our covers: The front cover oil of two elk was done especially for this issue of *Montana Outdoors* by Bigfork artist Elmer Sprunger; the back cover photograph of frost-covered autumn leaves was taken by Vince Claerhout of Pincher Creek, Alberta.



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Overview

Hunting season—a time looked forward to with eager anticipation by Montana's sportsmen—is just around the corner. Unfortunately, hunting season is also a time looked forward to with apprehension and concern by many of Montana's landowners. Despite the ongoing efforts of many interested parties, landowner/sportsman relations remain a serious problem.

In a recent outdoor recreation survey commissioned by the department (see page 13), more than half of the landowners questioned reported friction or problems with recreationists regarding access to or through their land. Thirty-nine percent of the hunters surveyed reported experiencing a problem with a landowner. Overall, 90% of the respondents agreed that conflicts definitely exist between landowners and those who use private land for recreation.

As resource managers, we have done a good job of designing regulations and management programs which maintain healthy wildlife populations. In developing these regulations and programs, we have attempted to consider the views of both the landowner and the sportsman. But these efforts do little good unless the result is a satisfactory experience for those who use the resource and those who own the land.

While Montana does have large acreages of public land, 57% of the state's total area is in private ownership—nearly 84,000 square miles in all. In eastern Montana, especially, much of the prime big game habitat is found on private land. For example, in the southeastern part of the state, more than 80% of the antelope harvest and 85% of the whitetail harvest comes from private land. It is simply unrealistic to assume that we can have quality hunting and fishing opportunities in Montana without the widespread cooperation of private landowners.

Over the years, a number of programs have been established in an effort to improve relations

between sportsmen and landowners. Adequate trespass laws, assistance with big game depredation problems and hunter safety education are just a few of the long-standing endeavors. More recent efforts include an *ex officio* warden program designed to put more enforcement personnel in the field, a toll-free telephone number for reporting fish and game violations and stepped-up information efforts aimed at improving self-policing efforts by sportsmen.

In addition, new approaches are being explored, such as negotiating long-term easements across private land to reach public land and financial incentives to landowners who maintain wildlife habitat and allow public access.

All of these efforts have helped to resolve conflicts, and will continue to help as time goes on. But no amount of rhetoric, laws or new programs can accomplish as much good as individual sportsmen can, simply by observing the rules of common courtesy in their dealings with landowners.

We all hear the horror stories that make the rounds each hunting season—the greenhorn who mistakes a horse or mule for an elk, the fence-cutting four-wheeler who

churns a rancher's meadow into mud, etc.—but these isolated instances, deplored by any sportsman worthy of the name, probably get more attention than they deserve. The real answer lies in an understanding on the part of the thousands of basically decent, law-abiding sportsmen that the future of their sport rests on their collective ability to take that extra step—to *always* ask permission, to *always* respect the landowner's wishes, to *always* treat the land with the same respect they would if it were their own.

When treated with courtesy and consideration by sportsmen, the majority of landowners will respond with the neighborly generosity so characteristic of Montana's rural residents. The cooperation of both groups is necessary if department efforts to improve landowner/sportsman relations are to succeed.

As this year's seasons begin, we urge each of you to consider the landowner foremost while you are in the field. The future of Montana's hunting opportunities lies in the hands of him and his neighbors.



James W. Flynn



by Don Childress
illustrated by Jim Wantulok

WATERFOWL mortality and “die-offs” from lead poisoning have been documented since 1894. Waterfowl, particularly dabbling ducks like the mallard and pintail, are poisoned when they pick up spent lead shot pellets and grind them up in their gizzards. As in humans, lead poisoning in waterfowl causes muscle paralysis. Since poisoned birds can neither eat nor fly normally after the onset of the disease, they usually soon succumb

to predation or starvation.

No one disputes the fact that considerable quantities of lead shot are deposited each year in our nation’s wetlands (approximately 3,000 tons annually), or that lead poisoning is responsible for a significant amount of waterfowl mortality (an estimated 1.6 million to 2.4 million ducks, geese and swans annually—roughly 3% of our North American waterfowl population). But a battle has been raging for years

over the most commonly proposed solution to the problem: replacement of lead shot with nontoxic steel (see “The Steel Shot Gamble,” *Montana Outdoors*, May/June 1975).

In a nutshell, proponents of steel shot claim (1) that steel shot, in proper loads, is just as effective as lead and often more so for waterfowl hunting and (2) that steel shot does not harm the barrels or chokes of most shotguns. Opponents of steel shot claim (1) that gains in waterfowl populations resulting from a ban on lead shot will be more than offset by increased crippling losses due to inferior ballistic properties of steel

The Question of Steel Shot **Montana Waterfowlers at a Crossroads**



shot and (2) that steel shot is uneconomical and potentially damaging to shotgun barrels and chokes.

After weighing the evidence, the U.S. Fish and Wildlife Service (FWS) issued its final environmental impact statement in 1976, calling for implementation of a steel shot program. Progress has been slowed by what is referred to as the Stevens Amendment to the FWS appropriation bill, which in essence made enforcement of the steel shot program the prerogative of the individual states.

A number of state conservation

agencies initially opposed the steel shot program because they felt the FWS lacked evidence of lead shot ingestion problem areas and was premature in its timetable. However, a recent survey of all 50 states by the International Association of Fish and Wildlife Agencies (IAFWA) indicates some significant changes in attitudes toward the nontoxic shot program.

In 1976, only 33% of the states had some form of steel shot regulation, but by the 1980-81 season, 66% had implemented a steel shot program (Montana does not have a steel shot zone). Twenty percent indicated they

felt lead poisoning was a significant mortality factor in their states.

The survey indicated that a majority of the states (52%) believed the implementation of the steel shot regulation by the FWS on a state-by-state basis had been inadequate in addressing the lead poisoning problem. Yet only seven states thought flyway, national or continental implementation was necessary. None of the states felt lead ingested elsewhere caused significant mortality in their state.

A majority of states without nontoxic shot regulations felt hunter attitude was a problem. Most hunters

opposed to the program have expressed concern about increased crippling, poor killing power and possible gun barrel damage. Technological advances have since overcome many of those obstacles, but many hunters apparently haven't been informed of these advances.

Steel Shot Ballistics

Ballistically, differences exist between lead and steel, a fact that makes for controversy among various advocates. Over the past few years, sporting magazines have carried countless articles debating the ballistic merits of lead vs. steel. (The author does not purport to be a ballisticians and is merely reporting some of the facts regarding steel shotshells.) Ballisticians use three major criteria in rating ballistic effectiveness: pellet density, velocity and form. Steel is inferior to lead only in density. Ballistician Tom Roster states that steel's density shortcomings can be compensated for by using a shot pellet size twice the size of lead. In other words, the hunter who normally uses No. 6 in lead should shoot No. 4 in steel. He contends that by using the increased pellet size and increased velocities, steel can be as effective as lead shotshell loads.

The relative softness of lead allows a number of the pellets to become deformed during firing. These deformed pellets result in the long shot strings and flyers (stray pellets) characteristic of lead shotshell patterns. The ragged pattern tends to mask the hunter's poor shooting by hitting birds with a few pellets on the edge of the pattern.

In contrast, the harder steel pellets retain their spherical shape and produce a tighter, denser pattern with a shorter shot string. Hunters unfamiliar with steel have a tendency to miss more than with lead, yet cripple fewer birds.

The question of gun barrel damage has been solved with advances in technology. Early steel shotshells did in fact cause some barrel damage. These shells contained hard pellets with a number of impurities that caused imperfections on the surface of the pellets. These early shotshells also lacked a protective shot cup, which allowed the steel pellets to be in direct contact with the barrel. Modern

steel shotshells now contain a softer, higher quality steel enclosed in a plastic shot cup. The problem of barrel damage has been reduced to a question of choke expansion. Such expansion depends on barrel hardness, thickness and the degree of choke. Industry experts maintain the problem is not serious for single barrel pump and automatic shotguns of post-1945 manufacture. Shot patterns and safety are not affected by such minor expansion (zero to .006 inch).

Hunters using foreign, cheaply manufactured or double guns with softer steel or very thin barrels are cautioned about using steel shot, because these guns may be more susceptible to damage. This is generally considered to affect very few waterfowl hunters today.

Recent studies to evaluate the effectiveness of steel vs. lead have moved from the laboratory to the field. These studies have revealed several salient facts about hunters and steel shot.

One of the tests, conducted at Tule Lake National Wildlife Refuge in Oregon, was designed to evaluate lead shot and steel shot for goose hunting. In this test, the 2-3/4 inch, 12-gauge shell with 1 1/2 ounces of lead shot in sizes No. 4, No. 2 and BB was compared with the same shell loaded with 1 1/4 ounces of steel, sizes No. 2, No. 1 and BB. Hunters using these loads bagged 16.8 geese per 100 shots fired with lead, while those using steel bagged 15.6 geese per 100 shots fired. Crippling rates were not significantly different between lead and steel, with lead loads crippling 40.7 and steel 35.8 geese per 100 shots fired. The authors concluded that there was no difference between lead and steel in bagging, crippling and missing rates.

Other results of the test showed that hunters missed 87 of 100 shots fired at distances greater than 50 yards. Similarly, the greatest crippling rates occurred at 30 to 50 yards. The distance from bird to hunter, not the pellet type, determined the number of birds bagged. Although most hunters express a definite bias toward lead, their own shooting abilities don't support the bias. From the evidence available, it is difficult to argue that steel is not an acceptable substitute for lead.

Is Steel Shot Coming to Montana?

The Department of Fish, Wildlife and Parks has been collecting waterfowl gizzards for eight years in some of the more heavily hunted areas of the state. Examination of nearly 8,000 gizzards collected so far reveals the lead ingestion rate in Montana's waterfowl falls below 2%. The FWS criterion for defining a lead shot problem area is an ingestion rate of 5%. From that perspective, Montana's waterfowl resource looks healthy.

As mentioned earlier, the IAFWA survey indicated a majority of the states do not feel the state-by-state approach is adequate in addressing the lead poisoning issue. A number of states in the Central Flyway, which includes a portion of Montana (see sidebar), are leaning toward a flywaywide concept. They contend that elimination of lead-shot poisoning in all areas—not just in those areas where ingestion is the highest—is the most ethical approach. Obviously, every time a waterfowl hunter fires a lead load over any shallow marsh, he is depositing a possible source of lead poisoning. With steel, the hunter eliminates any chance of poisoning.

A number of states have areas where lead poisoning is a very serious problem. These states have been confronted with a number of problems when they have tried to institute steel shot programs. Two basic problems have come to the forefront: hunter education and the availability of steel shotshells.

Conservation agencies themselves are at least partially responsible for the first problem. Without knowledge concerning new technology in steel shotshells, the significance of lead poisoning in waterfowl and management alternatives available, no wonder hunters have rebelled. The second issue comes in several shades of grey, and may well play an important part in Montana's decision regarding steel shot.

Presently, steel shotshells are available only in 12 gauge, 10 gauge and 20 gauge-3 inch. The FWS guidelines indicated all waterfowl hunters would be required to use steel regardless of gauge by 1980. However, reloading components for steel



FLYWAYS

Study Committee is a fact-finding organization, and the Council is a policy-making organization that relies on the Study Committee's findings.

The Study Committees are made up of waterfowl biologists from each state in the flyway, as well as representatives from the Canadian provinces. These individuals work on special problems concerning waterfowl and make recommendations to the Councils.

The Flyway Councils' memberships are more limited than the Study Committees'. Each state within the flyway boundaries has one vote and is represented by that state's director or his designate. Montana has voting membership on both the Central and Pacific Flyway councils. It is the only state with such a privilege. Although Montana was originally in the Central Flyway, banding information led to including a portion of Montana in the Pacific Flyway in 1961. Later investigations resulted in further expansion of the Pacific Flyway portion of Montana. However, it wasn't until 1980 that Montana actually gained voting membership in the Pacific Flyway Council.

The National Waterfowl Council is composed of two representatives from each of the four Flyway Councils. The National Council meets each year along with other national conservation agencies to discuss waterfowl regulations with the FWS. Once the season frameworks are established by the Secretary of the Interior, each state can establish waterfowl seasons within those framework dates.

Although annual waterfowl regulations are an important part of the activities of the Councils and Study Committees, they have also become instrumental in solving the nation's waterfowl problems. Management is no longer on the national level; it leans more and more toward individual populations. Montana waterfowl hunters have reaped many benefits as a result of the flyway management concept. The hunting of little brown cranes, whistling swans and common snipe, as well as changes in white goose regulations, have been the outgrowth of this management scheme. The sole purpose of the Councils is to preserve the waterfowl resource for the people.—Don Childress

shotshells are not yet widely available, and manufacturers warn that combining components intended for lead may pose serious hazards. Steel shotshells available commercially cost approximately \$3 per box more than comparable lead shotshells.

Manufacturers have been reluctant to mass-produce steel shotshells because of the uncertain marketing potential. Instituting steel shot regulations on a state-by-state basis would not give the ammunition manufacturers sufficient demand to increase production of steel loads. If the steel shot program were flyway-wide or nationwide, manufacturers have indicated supply would not be a problem.

Do Montana hunters have an ethical responsibility to convert to steel shot even though they contribute little to the overall lead poisoning problem? As pointed out earlier, the lead ingestion rate by waterfowl is low in Montana. It is doubtful whether any place in Montana, even under the "hot spot" concept (specified areas where steel shot is required), would fall under the steel shot requirements. However, Montana waterfowl migrate to and winter in areas where lead poisoning is a problem. Recognizing this, Montana waterfowlers do have a stake in the success of a nontoxic shot program.

How large a role will Montana's 22,000 waterfowl hunters play? Such a limited number of hunters could hardly affect the overall success of the program; yet, if each state were to take this attitude, the end result would be obvious (the present situation).

Proponents of the steel shot program believe that by making steel shot mandatory in from three to five years, manufacturers would have time to mass-produce the necessary ammunition. By that time, the cost would perhaps be comparable to lead, reloading components might be available and a wider variety of load combinations could be on the market. With such obstacles overcome and intensive information efforts in the meantime, steel shot would likely be more acceptable. Whether he bases his decision on facts or morality, it would appear that the Montana waterfowl hunter is at a crossroads.■

Ask a duck hunter what the term "flyway" means, and the response you will most likely hear is that it has something to do with the pattern of duck migration. Although the hunter is correct, the term has far greater meaning than most hunters realize.

The biological definition of the term gained political connotations during the late 1940s, when these migration corridors were incorporated into administrative or management units (Atlantic, Mississippi, Central and Pacific) to facilitate efficient waterfowl management. The flyways group together states with a common interest in particular waterfowl populations. However, the state boundaries in many cases do not follow the biological boundaries that waterfowl use.

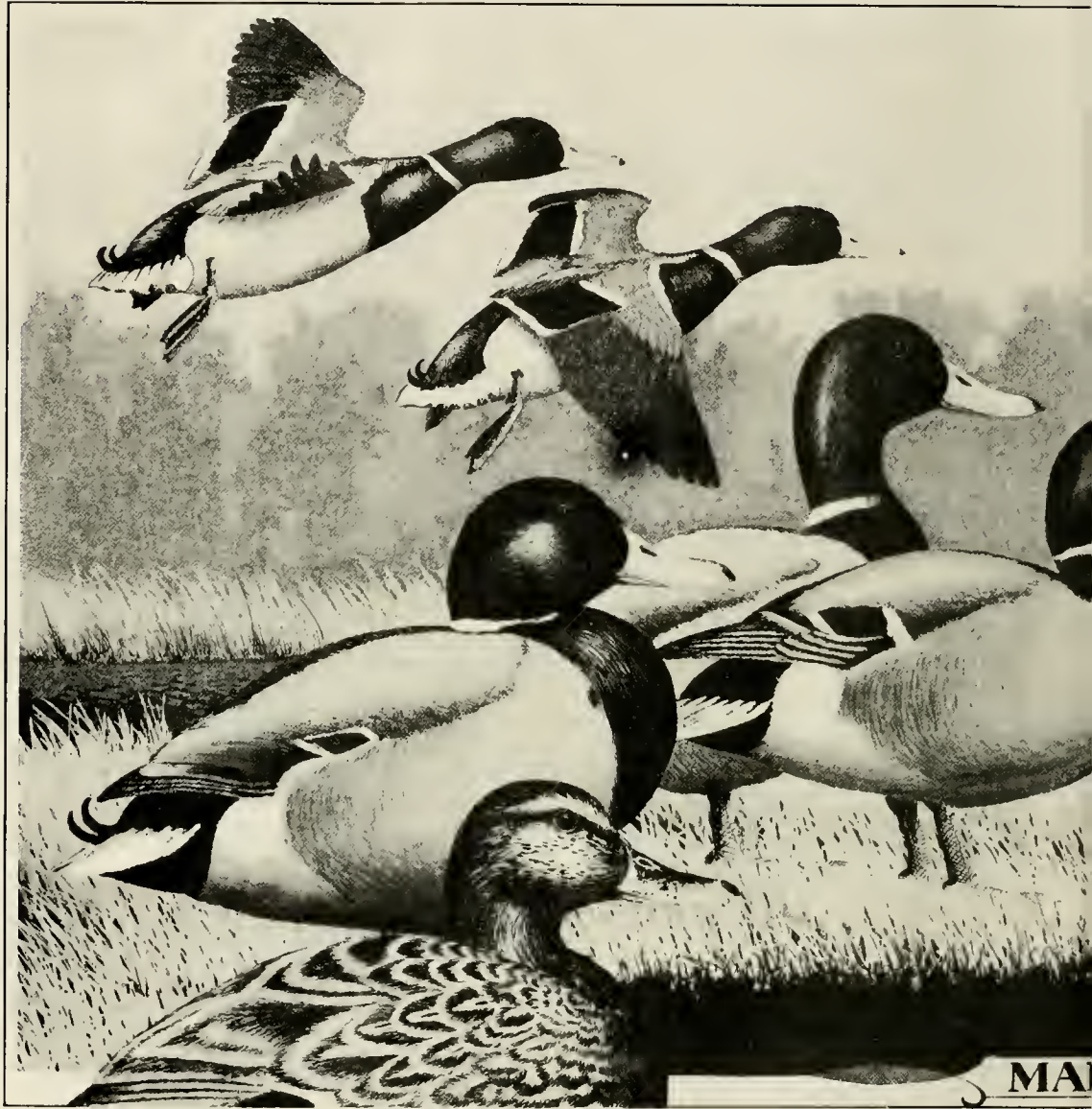
Before establishment of the management flyways, hunting regulations were adopted on a nationwide or regional basis. Regulations were largely the responsibility of the U.S. Fish and Wildlife Service (FWS). The shortcomings of such a system were obvious: Restrictions were applied over large areas, including many areas where they were not actually needed. Likewise, liberal regulations allowed excessive harvest in some areas where it was unwarranted.

In 1947, in response to the pressing demand for solutions to special waterfowl problems, conservation agencies began attacking the problems through cooperative efforts. These first groups were the forerunners of what today are called the Flyway Study Committees.

The success of these early groups prompted the International Association of Game, Fish and Conservation Commissioners (now the International Association of Fish and Wildlife Agencies) to adopt a resolution calling for creation of a National Waterfowl Council and Flyway Councils in each of the four flyways. In 1952, these Councils were created.

Both the Flyway Study Committees and the Flyway Councils remain today. Each has its separate role in waterfowl management. The

BOTULISM: Grim



by Charles Eustace
illustrated by Jeff Walker

IT IS NOT yet dawn and the marsh lies wrapped in hush. No chirping cricket, no darting yellowlegs snapping up careless water striders. Stilled are the aerial patrols of the green darner dragonfly, Mother Nature's deadly biplane. Head tucked under wing, slumber restores the mallard hen wearied by the long flight north and frenzied courtship activities; her eggs

enclosed by warm down snuggle beneath her brood patch. All life rests before resuming the ageless rituals which have brought the marsh dwellers to this point in time.

Resting too, submerged below the unrippled surface in primordial time capsules bedded in the bottom ooze, are microscopic plant forms that could mean death for untold thousands of waterfowl still asleep

on the marsh. They await only the ominous mix of circumstances that will stir them from their state of suspended animation. They are *Clostridium* bacteria—the bacteria that produce botulism.

Botulism can hardly be called the new kid on the block, but yet we have no recorded instances of it until comparatively recent times. The first records of what we believe to have been botulism are from Owens Lake, California, in 1876. The grim reaper continued to gather in the waterfowl harvest over the years without

Reaper of the Marsh



stirring strong concern until 1910, when literally millions of waterfowl fell to the scythe in California and Utah.

This time the magnitude of the problem was too great to be ignored. In 1913, California biologists began to investigate the cause of what had become known as "western duck sickness." These early workers came to the conclusion that the disease organism was in the water itself. Studies over the next several years in alkaline lakes around Great Salt Lake, Utah, supported this theory

and pointed to high concentrations of dissolved salts as the culprit. Hence, the name "alkali poisoning" came into use. These early observations, however, were not entirely correct, as we can see with the aid of 60 years' hindsight, but they provided an important starting point for further work. One of the shortcomings first noted was that alkali poisoning also occurs in water with very low concentrations of dissolved salts.

In 1927, biologists began investigations near Klamath Falls, Oregon, and by 1930 had isolated the micro-

scopic bacterium *Clostridium botulinum* type C as the disease agent. *Clostridium* has a family tree full of sinister characters known as botulism types A, B, C, D, E and F. All of them produce botulism but fortunately they specialize, rather than aimlessly poisoning everything in sight. Some attack humans, some livestock and some chickens, but type C is best known for its morbid affinity for wild aquatic birds. To date, no human is known to have died from eating a botulism-poisoned duck. But then, to be truthful, few



records are kept on people who might exhibit such culinary habits!

Since its correct diagnosis, botulism has been documented throughout North America, Europe, South Africa, Uruguay and Australia. The western portions of the United States and Canada, however, are the recognized strongholds of waterfowl botulism with California and Utah at the head of the list.

The life requirements of botulism bacteria are few and simple. They need temperatures high enough for germination, metabolism and reproduction. A temperature of 78°F is optimum. They are anaerobic, so they need an oxygen-free environment (as saprophytes, they obtain nourishment from dead and decaying organic matter—a highly unlikely spot to obtain fresh air). When these high-class living conditions start to deteriorate, the botulism bacteria produce spores—a resting stage allowing them to live through periods of adversity, for years if necessary, while awaiting the recurrence of conditions favorable to germination.

All the questions surrounding botulism have not yet been answered. Research, however, has allowed us to discard some old theories and substantiate new ones. The disease itself is a form of food poisoning, resulting from consuming foods contaminated by botulism toxin. The toxin is a byproduct of metabolism and occurs within the bacterium itself, not in the water as early investigators thought. In fact, work done in California showed that when the toxin itself is mixed with various water samples, in most cases it breaks down so rapidly that it can't be detected in tests a short time later.

When a duck eats food containing botulism toxin, the toxin itself is absorbed through the lining of the digestive tract, passed into the blood stream and transported to the nervous system. Muscle paralysis results and is first visible in the neck muscles, causing the head to hang limp, a condition which led to the early name of "limber neck." If the bird is in the water, it may drown due to inability to raise its head. If the victim is on land, paralysis will continue until the muscles of the diaphragm become paralyzed and the bird dies of suffocation.

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The Catchall

Urban Expansion and Antelope

Most Montanans are accustomed to seeing antelope on the sagebrush-covered plains. However, several intermountain valley antelope herds inhabit other types of terrain. They are native to those areas, or have been transplanted into them.

THE "WINSTON FLATS" ANTELOPE

Early History

Antelope were apparently native to the area lying between the present towns of Winston and Townsend—west of the Missouri River. In "The Journals of Lewis and Clark," Bernard De Voto indicated the two explorers had observed antelope in this area in the early 1800s.

As this area became settled during the next 100 years, evidence indicates the numbers of antelope declined. R.F. Cooney, former chief of the department's Game Management Division, wrote in 1944: "During the early 1920s, approximately seven antelope were reported in the Winston area (flatlands on either side of the highway from Winston to Bedford, about four miles north of Townsend)."

Another unpublished department report written in 1942 indicated an estimated 120 antelope in Broadwater

County. In the same report, the following comments appeared: "Report of W.H. Voorhies: States there is about 200 head scattered from Beaver Creek near Winston to south of Radersburg" and "Report of Frank R. Marshall: One small band of 75 head run south of the town of Three Forks on what is known as the south bench. Another herd of 100 head range from the foothills near Radersburg to the Missouri River near Winston (Broadwater County)."¹

In a 1943 document, Cooney further noted: "This species [antelope] of big game has increased steadily in the area since that time [1920]. Estimates have ranged during recent years between 100 and 175 animals.

"The antelope that range in this area are easily visible from both the highway and the railroad. For this reason, the herd possesses a particularly high aesthetic value. The range over which they forage is primarily of the open grassland type. The majority of this area is used as winter range by livestock, particularly cattle. Winds and relatively light snow allow easy access to forage during the winter months.

"Little is at present known of the development of the small herd in the vicinity of Radersburg. It is felt,

however, that there may be a rather unimportant connection with this group and the Winston herd. During the summer months the antelope in this group are scattered quite widely over the flatlands in a relatively wide belt lying between Radersburg and the Missouri River. With the coming of winter, they move up into the rolling hills on both sides of Radersburg."²

Recent History

Although the 1940s marked the beginning of efforts to obtain information about the "Winston Flats" antelope, the status of the herd was not well documented during the '40s or the early '50s. Don Childress, a department biologist formerly at Townsend, wrote: "The population is difficult to trace during the 1940s. Surveys which were conducted were generally made on large survey units and in most instances included several antelope herds. The Winston herd was part of the Boulder [Management] Unit during the '40s. In 1944, a total of 260 antelope were counted in the unit. As a part of the survey, an estimate of range capacity was also made. Initial figures of the capacity centered around 600 antelope. Later census efforts indicated that the population climbed to 900 and 1,100 in 1950 and 1952, respectively. [Childress obtained these figures from reports compiled by Don L. Brown. See footnotes ³ and ⁴ for complete citations.]

"Parallels with later surveys are difficult since specific herds or distributions were not given in the early reports. The Boulder Unit during the 1940s did, however, include two major hunting units now designated as Hunting Districts 380 and 370 on the Montana Antelope Hunting Map. The combined surveys in these two units in 1965 indicate the population had declined to below 500.

"We are more closely able to follow the Winston herd from the 1960s through the present....The 1965 summer population census totaled 186 antelope but included a small number of antelope outside the Winston herd. The population remained stable until 1972 when the census indicated the population had nearly doubled. The combined census figure for Hunting Districts 380 and 370 in 1978 was 861 compared with 1,100 in 1952 and 494 in 1965."⁵

The following table presents



RALPH
KRIEG
'81

observations of antelope during specific aerial surveys:

Year	Number of Antelope Observed
1965	186*
1967	166*
1969	164
1972	302
1975	263
1978	326

* Includes antelope east of Canyon Ferry Reservoir.

It is apparent that antelope have been present on the Flats for a good many years. Evidence also indicates their numbers fluctuated (as do all wildlife populations) probably in response to changes in the quality and quantity of the habitat.

For many years, motorists and passengers on the Northern Pacific Railroad Mainstreeter were the major "users" of these antelope. Construction of pull-offs and information signs along U.S. Highway 12/287 gave both Montana and out-of-state motorists ample opportunity to view these antelope.

From 1945 until 1952, the department utilized this antelope herd as one source of stock for introductions into areas with few or no antelope. Department records indicate the following antelope trapping activities on the Flats:

Year	Number Trapped	Release Site
1945	22	Canyon Ferry
1946-48	205	Deer Lodge Valley
1952	10	Moiese National Bison Range
1952	34	Gregson (Hot) Springs
1952	27	Indian Creek (Madison County)
1952	34	Cedar Creek (Madison County)

In 1951, the Flats were included in a large management area referred to as the Big Belt-Boulder Management Unit. Also, in 1951, antelope hunting was allowed in a portion of Broadwater County; 75 either-sex permits were authorized. Most of the county lies within the management unit, but it is unclear exactly in what portion of the unit the season was held. An estimated 147 antelope were harvested in the Big Belt-Boulder Unit, but it is not known if any of these antelope were harvested from the Flats.

During 1953 and '54, antelope seasons were held south of Indian Creek, which did not really include the Winston Flats.

In 1955, the area lying "...west of the Missouri River and between Indian and

Beaver creeks..." was open to the hunting of 100 antelope of either sex. This is probably the first time the Flats were actually open to the hunting of antelope in recent times.

The Flats were open to antelope hunting from 1956 to 1967. In 1968 and 1969, the area was closed to antelope hunting. With the exception of 1973, the Flats have been open to antelope hunting each year since 1970.

The hunting seasons have opened as early as Sept. 10 (1955), but have usually begun around mid-October. Generally, hunting seasons last about four weeks. All antelope hunting has been by permit only, including the archery-only season.

From 1945 until 1980, between 1,000 and 1,100 antelope were removed from the Flats by trapping and hunting. Antelope densities on the Flats during the early '60s and at present indicate these removals did not adversely affect the antelope population.

Current Threats

But a new dilemma now faces the antelope and their management. The following account by Childress adequately describes the situation: "A major turning point in the history of the Winston Flats antelope herd occurred in 1973. In that year an estimated 240 acres of rangeland on the Flats were broken and put into agricultural production. The same year the Lakeview

grain. In 1979, a portion of the acreage was seeded to alfalfa. The problems intensified when as many as 200 head of antelope virtually camped on the field.

"The first subdivision was slow to develop and only two homes were built during the initial years. By 1977, the area was caught up in the economics boom and by 1979 seven additional subdivisions were filed in the County Courthouse. The building pace had quickened and by the spring of 1980, 34 residences and two commercial buildings had been constructed.

"Although the numbers seem small, the future [for antelope] looks dim. The potential of the existing subdivisions is four to five times the present number of homes. More significant is the distribution of the current subdivisions. In 1973, the antelope herd range comprised nearly 33,000 acres of the Winston Flats. Because of their sprawling character, the subdivisions now occupy over 5,000 acres of the former range.

"More critical is the fact that the winter range has been the hardest hit. Most winters in the area are considered open and rather mild by Montana's standards. Townsend, at the south end of the Flats, boasts of being a 'banana belt' in Montana. During critical heavy snow periods, however, antelope are forced onto a range of 6,000 acres or less. Most of this critical winter range is in the area of the subdivisions and agricultural development. In 1978 when snow conditions were very severe, antelope were forced into an area of less than two square miles [1,280 acres]. Nearly the entire population was found in this area for a short period. Although there was no evidence of starvation, losses resulting from vehicle and train collisions and other causes may have reached nearly 15% of the population during the period.

"In 1979, residents of the subdivisions began expressing concern over safety during the hunting season. Although there hasn't been a formal petition by residents to close the hunting season, the department has begun to take steps to ensure that recreational opportunity in the form of hunting will continue, yet provide the residents with some degree of satisfaction.

"At this point in time, the impacts of the development on the Winston Flats antelope herd have been subtle. During the tough winter mentioned earlier, the local newspaper ran several pictures of antelope standing along the highway and railroad tracks. No mention was made of the fact that their traditional range was now crowded with homes

and barking dogs.

"Prognostications of doom are of course easy to make. The past has shown plenty of examples. Wildlife management has been able to champion several arenas but whenever the dollar has been our enemy the battle against habitat destruction has been dim."⁶

This reduction of wildlife habitat (antelope in this case) is not unique, nor even an isolated case. Subdivisions, grain production, superhighways, strip mining and a myriad other uses of the land are all legitimate endeavors. The thing we must recognize is that when the habitat of wildlife is altered or eliminated, the wildlife populations are reduced or eliminated. Wildlife are products of, and dependent on, their habitat.

THE HELENA VALLEY

A parallel to the Winston Flats antelope can be found in the Helena Valley a few miles to the northwest.

A brief history of the Helena Valley antelope was outlined by Childress: "In 1946, a small antelope transplant was made in the Helena Valley. [Childress was quoting from a 1976 report. See footnote ⁷ for a complete citation.] Habitat conditions at the time indicated a carrying capacity estimated at 500 antelope. Documentation of herd size is again sketchy but it appears the population never reached the original estimate of the carrying capacity. A 1964 aerial survey indicated a population of nearly 100 antelope. Population parameters were not startling. Fawn production was only fair with 62 fawns per 100 females. The buck-doe ratio, however, showed characteristics of an unhunted herd with 162 bucks per 100 does. A permit quota of 25 was set and the first hunting season began in 1964.

"A census flight was again made in 1967 and a total of 36 antelope were counted. Comments in the report indicated that the antelope range was becoming restricted and that future seasons should be designed to alleviate depredation problems. The permit quota was reduced to 15. By 1969, the season was closed. Census flights continued in the unit despite the closed season but again the 1970 survey showed only 39 antelope. As a result, census flights were discontinued until 1979 when a winter survey was made. [The winter survey was conducted by G. Olson and others. See footnote ⁸ for a complete citation.] The population had responded in two respects. The total number of antelope counted had risen to 115. Probably more significant was the fact that no antelope were found in the

Helena Valley where the original herd had been."⁹

Antelope were not the only wildlife to decline in the Helena Valley. Department wildlife biologists John Weigand and Reuel Janson noted in 1976 that the "...Helena Valley, which was considered good pheasant hunting through the early 1950s, has passed from the limelight too."¹⁰ Their information indicated a 93% reduction in pheasant density indicators from 1949 to 1958. They concluded that the "...progressing cattle-alfalfa complex, coupled with urban expansion and popular horse-raising, has dealt pheasant habitat [in the Helena Valley] a severe blow." A few pheasants are to be found in the Helena Valley today, but only a shadow of their former numbers.

The "progress" of urban expansion in the Helena Valley has been dramatic. There were an estimated 1,500 people there in 1965. By 1970, the population had grown to 1,700 persons and to nearly 6,000 persons by 1980, according to officials from Lewis and Clark County.

CONCLUSIONS

With an influx of people and their dwellings, it is frequently stated that poaching is the reason for the demise of a particular species of wildlife. Poaching has little, if any, effect on the density of wildlife. It is overemphasized and there is little, if any, documentation in Montana to support the purported drain on a wildlife population due to poaching.

Predation is another often-used "excuse" for the decline of a wildlife population. The predator-prey relationship occurring in the wild has been in effect for thousands of years. If the natural predators *could* wipe out the prey population, they would have done so long ago. As long as the prey has adequate habitat, it can cope—albeit flourish—with predation and controlled hunting. Reduce or eliminate the quality or quantity of the habitat and *all* desirable wildlife in that area—both predator and prey—will diminish.

The loss of wildlife habitat is generally an insidious process. Rarely does a single event or even a single occurrence in an entire process result in dramatic change. Events such as Mount St. Helens' eruption are, of course, exceptions. It is difficult to link a single event or point in time with the ultimate outcome *before* the fact. Post-mortem is easy.

As Childress noted in his 1980 study, "The first to recognize the changes will of course be the sportsman. The opportunities for hunting as it has been in the past will soon disappear. The

chance for the general public to see antelope will probably continue for some time into the future but most people will never know the past. The activities described thus far may only be part of the burden...[these herds] will eventually bear....The Flats [have been designated] as one of the preferred routes [for the Northern Tier Pipeline] across Montana. Although each of the described activities alone may not be the one that breaks the camel's back, collectively the future looks dim. The loss of the Winston Flats antelope herd will definitely be a loss to Montana's great heritage."—Joe Egan, *assistant administrator, Wildlife Division*

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Joe Klabunde Honored

In his long years of service to the state and to Montana's sportsmen, Joe Klabunde has earned many awards, honors and distinctions. For example, he holds the record for service on the Montana Fish and Game Commission—12 years and five months. He served under four governors and with 20 other commissioners. He was appointed commission chairman on Jan. 3, 1977, and served until March 1981.

In June, Klabunde's colleagues and friends gathered at a send-off party in Helena. Among the gifts presented was a painting by Marlowe Urdahl of Bozeman (see the above photo of Klabunde, left, and Urdahl), whose art also appeared on the 1978 Montana Bird Stamp.

Among Klabunde's contributions to the department was his support and vote for purchase of land. During his tenure on the commission, the department purchased 110,000 acres of the total acreage it now owns. Another contribution was his ability to get along with many different kinds of people—and his deftness at understanding them and relating to their problems.

Accomplishments during Klabunde's term which he views with particular satisfaction were the setting aside of the Fort Benton to Fred Robinson Bridge stretch of the Missouri as a "Wild and Scenic" river; the purchase of Mount Haggin, and the purchase of Wild Horse Island.

On the personal side of the ledger, Klabunde and his wife Connie celebrated their 40th anniversary in November of 1980. They have three children: Maurice, Bozeman; Ramona Klabunde Towe, Glasgow, and Kathy Klabunde Bachini, Havre.

Klabunde received another award at the June banquet. He was presented with one of the Western Association of Fish and Wildlife Agencies' "Special Awards." The awards are given for noteworthy contributions a bit out of the ordinary, above and beyond the call of duty. Joe Klabunde's contributions to the Montana Fish and Game Commission, to the Montana Department of Fish, Wildlife and Parks and to the state's sportsmen were of that sort.

Posewitz Wins MWF Award

The Montana Wildlife Federation (MWF) has named Jim Posewitz "Conservationist of the Year." Posewitz is administrator of the Department of Fish, Wildlife and Parks' Ecological Services Division.

The award was presented to him at

the federation's annual banquet by Gov. Ted Schwinden.

In awarding Posewitz the title, Rich Day, MWF president, noted that "few individuals have accomplished the natural resource conservation and protection" that Posewitz has. Day said, "We still have water in the Yellowstone River in which to fish, and wildlands in

the Rocky Mountain Front in which to hunt and hike, thanks to Posewitz's efforts."

In 1974, Posewitz earned the prestigious American Motors Conservation Award.

Other awards presented at the MWF banquet included:

- Noel Rosetta, Helena—"Sportsman of the Year"
- Dorothy and Ray Nitz, Hingham, and Art Sheldon, Libby—"Outstanding Achievement in Conservation."

Correction

The "Vincent" referred to in Norm Peterson's article, "Worthy of 'Extra Special Concern,'" in the July/August 1981 *Montana Outdoors*, should have been Robert E. Vincent and not E. Richard Vincent. Robert E. Vincent received a Ph.D. from the University of Michigan in the early 1960s. E. Richard Vincent is a fisheries biologist for the Department of Fish, Wildlife and Parks in Bozeman. We apologize to both.



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Recreation Survey Reveals Attitudes

by Steve Bayless and Susan Rose, Wildlife

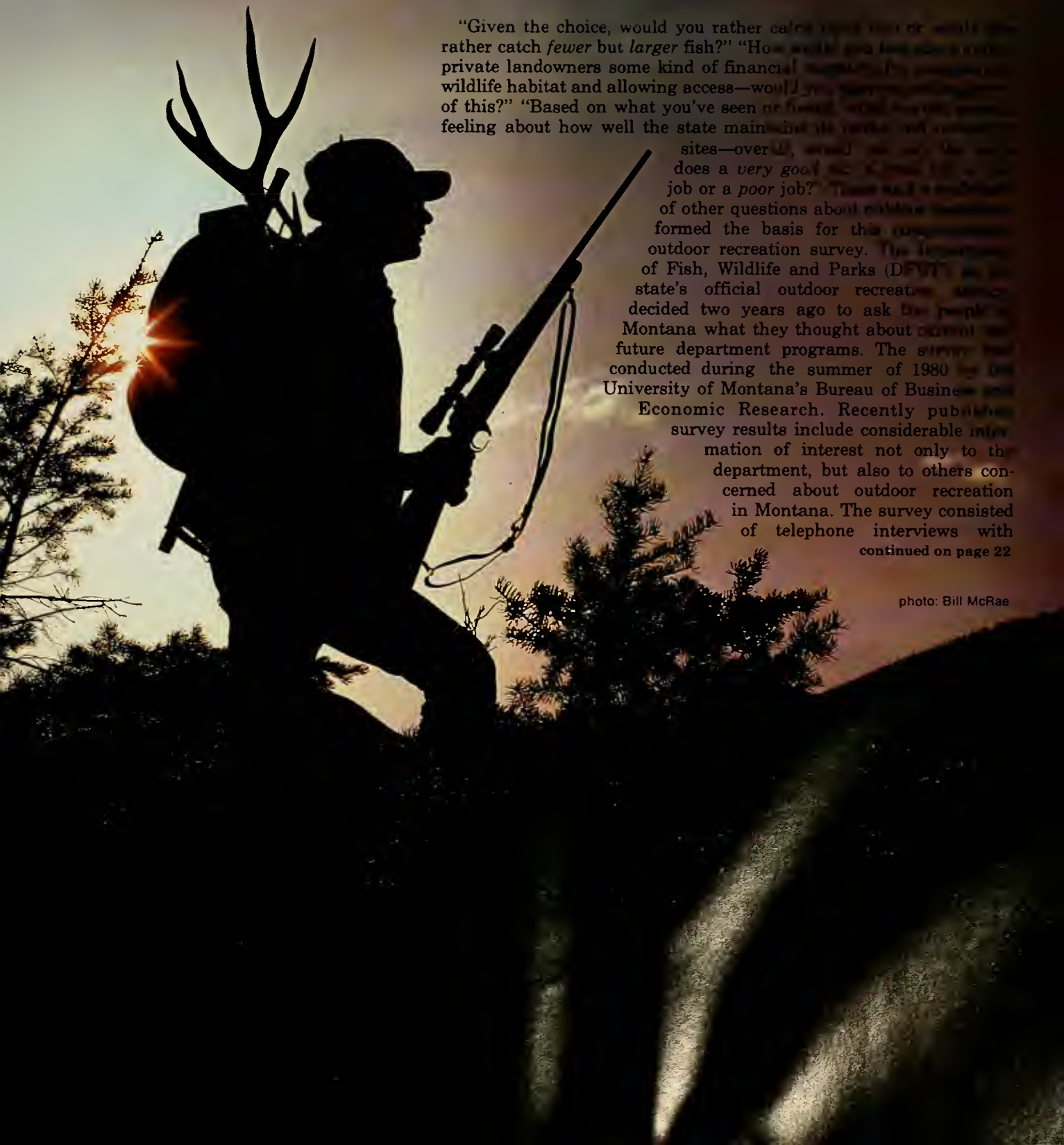
graphics by Michael Fournier

"Given the choice, would you rather catch *more* but *smaller* fish or would you rather catch *fewer* but *larger* fish?" "How would you like to provide private landowners some kind of financial incentive for providing wildlife habitat and allowing access—would you support something of this?" "Based on what you've seen or heard, what's your general feeling about how well the state maintains its parks and recreation

sites—over all, would you say the state does a *very good* or *good* job or a *poor* job?" These and a number of other questions about outdoor recreation formed the basis for this comprehensive outdoor recreation survey. The Department of Fish, Wildlife and Parks (DWP), the state's official outdoor recreation agency, decided two years ago to ask the people of Montana what they thought about current and future department programs. The survey was conducted during the summer of 1980 by the University of Montana's Bureau of Business and Economic Research. Recently published survey results include considerable information of interest not only to the department, but also to others concerned about outdoor recreation in Montana. The survey consisted of telephone interviews with

continued on page 22

photo: Bill McRae



Prescribed Fires:
**R_x FOR WILDERNESS
AND WILDLIFE**

by E.M. "Sonny" Stiger and Beverly Stiger

It was an early afternoon in late September of 1977. I had put my horses in the corral at the North Fork Guard Station in the Scapegoat Wilderness and hiked up into the old 1952 burn behind the cabin. Intent on taking pictures of the post-fire vegetation, I sensed someone or something looking at the back of my neck. Turning cautiously, not really sure I wanted to know who or what was there, I found myself eyeball to eyeball with a young grizzly! Or to be more precise, eyeball to breadbasket, since he looked to be about nine feet tall! Before I could react, he did, turning on his heels and heading down through the tall ceanothus, making a wake like a big old carp in shallow water. My mind kept repeating, "Take his picture," but my hands were immobile. I did get a lovely shot, however, of the spot where he had been standing only a split second before. As he entered the unburned timber on the other side of a little draw, still going hell-bent-for-leather, my constricted throat let me breathe again.

Ol' Griz, I suppose, had been out there grubbing for bugs and tender roots. I remember my Dad always telling me to hunt the old burns, because that's where the game would be. After a fire, the browse resprouts with young, succulent growth, and there's a burst of nutrition in the forbs and grasses. It's truly a forest born again.

This burn now supported a sea of ceanothus and young trees about 15 feet tall. The old snags, with a dignified

beauty all their own, cast an eerie spell over the whole scene. The grizzly encounter had dampened my picture-taking enthusiasm though, and glancing over my shoulder at regular intervals, I made my way back down the slope to the security of the guard station enclosure and the companionship of my horses.

Most people today understand "edge effect" in terms of wildlife habitat. The 1952 fire at the North Fork Station had consumed about a thousand acres of old growth timber and created several miles of "edge"—edge that provides, on the unburned side, cover and shelter and, on the other side, habitat for feeding. The snags within the burn provide homes for cavity-nesting birds and perches for raptors to survey the open area for small mammals that frequent the area now warmed by the sun.

As I settled down in the snug cabin for the night, I began to reflect on a meeting I had had two months earlier, in July. The Lincoln District Ranger and I had packed into the Scapegoat Wilderness to meet a Wilderness Society-sponsored group of horsemen to discuss our prescribed fire plans for the Scapegoat. As we unsaddled our stock, we noticed the sky had turned prematurely dark for that time of the afternoon. Looking to the west, we could see that the sun was just a red glow. The smoke seemed to be coming from the direction of Missoula. Sure enough, as we found out later, we were witnessing the smoke pall from the Pattee Canyon fire—a raging forest fire that destroyed six homes on the outskirts of Missoula. We must constantly be aware that fire is a double-edged sword, providing benefits in some situations and causing damage in others.

That evening, after a delicious dinner of steak and hashbrowns, the campfire talk turned to the effects of fire in the wilderness. Anyone knowing forest successional patterns and species relationships can readily observe that a high percentage of the vegetation in most forest areas is at one stage or another of succession following past fires. Biological activity, productivity and diversity increase along the edges created by these fires.

The plan being developed for the Scapegoat Wilderness and portions of the Bob Marshall Wilderness, we explained, would allow lightning fires that meet strict "manageability" criteria—i.e., those that can be confined within fire management unit boundaries with acceptable effects—to burn freely within predetermined boundaries. This means that areas of "heavy" fuels may "crown out" and burn intensely under dry and windy weather conditions, thereby returning the vegetation to an earlier successional stage. Such fires, however, will not burn everywhere with the same intensity. At other times and in areas with "light" fuels, low-intensity fires will prevail, thus producing a mosaic of vegetation age classes and a diversity of animal and plant life. The areas under study lend themselves well to confinement of fire by natural barriers, since much of the wilderness boundary is made up of ridges and hogbacks with very little fuel.

We also explained that there are only two kinds of fire as far as wildland management agencies are concerned: prescribed fires and wildfires. A wildfire is an unwanted fire that requires prompt suppression. A prescribed fire is one burning under specified conditions that will accomplish certain planned objectives. These may be planned ignitions by firemen to clean up debris or to improve rangeland, wildlife habitat or timber growth; or

• *Prescribed fire planning was initiated in the Scapegoat Wilderness and Danaher portion of the Bob Marshall Wilderness in 1977. It has been implemented as of the 1981 fire season. A plan for most of the rest of the Bob Marshall and Great Bear wildernesses is targeted for 1983 or 1984. Before a fire is designated a "prescribed fire," fire managers will ask:*

- (1) *Is the fire lightning caused or person caused?*
- (2) *Does the fire threaten public safety or private property?*
- (3) *Is the fire likely to escape from a designated area?*
- (4) *How will it affect air quality?*
- (5) *How does the total local and national fire situation look?*
- (6) *What is the weather, and what is the forecast?*
- (7) *Are the necessary resources available in case of trouble?*
- (8) *How many fires are already burning, and where are they?*
- (9) *Will there be effects on resources outside the wilderness?*

Not all fires will be designated "prescribed fires." Some will require immediate suppression. Those that meet pre-designated criteria will be watched closely to be sure they stay within the prescription. Suppression action will be taken when necessary. Forest visitors will be advised of the fire situation and precautions will be taken to assure public safety.—Ed.

they may be from unplanned sources, such as lightning, when the ensuing fire is within prescription. A prescription consists of a predesignated set of criteria established for the use of fire to accomplish specific land and resource management objectives. Preparing a prescription often requires several years of careful study.

Wilderness prescribed fires require a close vigil. Monitoring crews must daily determine if a fire is still within prescription. This includes steps to ascertain the public safety and a systematic process of collecting and recording fire behavior and environmental information for the purpose of predicting daily changes in fire size, direction and potential to damage resources outside the wilderness.

Managing a wilderness prescribed fire is not easy. It involves risk and it costs money. The weather can change without notice; smoke can cause unforeseen problems, and crews may have to be called in to keep a fire within the designated area. Faced with the risk and the cost, the question might be asked, "Why do it at all?" The answer is simple: As human societies continue to modify landscapes at an ever-increasing rate, the idea of perpetuating truly natural baseline communities of plants and animals has increasing merit. Through prescription, we can manage wilderness fire rather than committing suppression resources that, in the final analysis, are simply not compatible with the wilderness concept. The forces of nature should be allowed to dominate the landscape wherever possible, without jeopardizing lives, property or resources outside the wilderness; and man's activity should be limited to that of an unobtrusive observer.

As the campfire died away to a few glowing embers and everyone headed for their tents, we doused the campfire and turned in with a good feeling that they, as part of the concerned public, were not only aware of the dangers of fire, but also had a better understanding of its beneficial role.

* * * * *

Up until a few years ago, the USDA Forest Service (FS) was guided by a policy which stated that *all* fires will be attacked with enough people and equipment to gain control as quickly as possible. Each fire was suppressed, regardless of possible benefits. To carry out this policy, large expenditures were sometimes made to minimize the acreage burned. This suppression policy was not always cost-effective or responsive to land management objectives such as the perpetuation of natural wilderness ecosystems. In many cases, too, fire can be used outside of wilderness areas as a tool to improve wildlife habitat or livestock range, or to reduce competition to timber crop trees. As firemen, we knew that in some cases many dollars had been spent and sometimes lives had been lost in putting out fires that, in the long run, may have actually benefited resources such as wildlife, range and timber.

This is not a recent revelation. It had been known for many years that whether a fire is beneficial or detrimental depends on the land use objectives. But the first designated fire management area in forested western wilderness did not come until 1968, when one was established in Sequoia and Kings Canyon National parks in the central Sierras of California. The objective of this classic project, which is



1973



1974



1975

Vegetation in the northern Rocky Mountains responds well to wildland fires. This three-year sequence records the rapid return of herbaceous plants and shrubs to this wilderness site following a 1973 fire that was allowed to burn on the Bitterroot National Forest (photos: Robert W. Mutch).

Prescribed Fires—Safety Tips

If you visit a wilderness area, you may come in contact with a prescribed fire. If you do, consider the following:

- (1) Fires generally travel faster uphill than downhill.
- (2) Fires normally move in the same direction as the wind. Take note of which way the smoke is blowing and find a safe location away from the fire's path.
- (3) Large, open meadows located upwind and downhill from a fire usually afford safety. You can also be seen or contacted from the air in open spaces if necessary.
- (4) Keep your party together.
- (5) Be alert for wind changes and falling trees or limbs.
- (6) Don't panic. Most fires move slowly unless high winds are blowing. Take time to determine the most likely path of a fire and act accordingly.

All wilderness visitors should understand that fire has a natural role. Remember that a person-caused fire is not natural. Continue to be careful with your use of fire.—*USDA Forest Service, Northern Region*

still in operation, was to restore natural environmental conditions. Research had shown that man's suppression of lightning-caused fires, which previously had burned naturally in the sequoia groves every nine or 10 years, had resulted in a dangerous accumulation of forest fuels which, if burned accidentally, could have destroyed the big trees. The elimination of natural fires had also resulted in other trees, primarily white fir, filling in the formerly open forests and effectively preventing giant sequoia seed germination. Look around, and you will find comparable conditions in some of the timber types in Montana.

Closer to home, in 1970 the USDA Forest Service launched a study on the Bitterroot National Forest in the Selway-Bitterroot Wilderness in northern Idaho to develop procedures for allowing fire to play a more natural role in wilderness areas. Called the White Cap Study, this project provided the necessary technical background for the FS to continue wilderness fire management planning in other portions of the Northern Region, as well as elsewhere in the country.

A lightning fire that started in August of 1973 in the White Cap Study Area provides an example of the wilderness fire management concept. The fire, most of which was allowed to burn free, covered an area of 1,200 acres over a 43-day period before it was rained out in late September. The aftermath amply demonstrated the significant effects of a natural fire on the wilderness ecosystem. Most shrubs were resprouting two to three weeks after the fire. Willows were up one foot high. Grasses grew two to three inches. Deer, elk and bear were observed within the fire perimeter during the fire period, and many grouse were observed in the burn daily, even while it was still smoking, apparently feeding on grass seed in the ashes.

Redstem ceanothus, an important browse species for deer and elk, whose seed can lie dormant in the soil for 100 to 200 years until stimulated by a fire, rose from the ashes like the legendary phoenix. From 9,000 to 80,000 redstem seedlings per acre sprouted following the fire! The fire also provided valuable managerial experience,



The "edge" effect created by a forest fire provides excellent wildlife habitat (photo: E.M. "Sonny" Stiger).

public response (mostly favorable) and information for the formal environmental impact statement on wilderness fire issued by the Northern Region of the USDA Forest Service in December of 1976.

* * * * *

These and many other thoughts were running through my mind as I came out of the Scapegoat Wilderness in September of 1977. It had been drizzling for four or five hours and water was dripping off the brim of my hat and running down my neck, and my saddle horse clop-clopped along through the mud and rocks, anticipating a panful of oats, a dry trailer and a warm barn. The packhorse echoed his attitude and crowded close, trying to keep the rain out of her ears.

In spite of the soggy world around me, I felt good. Memories of Ol' Griz were still prickling my mind, and I felt we were as ready as he was to accept fire in the natural scheme of things. After all, in terms of universal processes, fire is as natural as the very rain dripping off my hat.

Postscript

Since the White Cap Study in the Selway-Bitterroot Wilderness, the Northern Region of the FS has established fire management areas totaling more than 3 million acres where fires can be managed to meet resource management objectives. In 1979 alone, more than 32,000 acres were burned within prescription by utilizing lightning ignitions. The fire management plan in the Scapegoat Wilderness and Danaher portion of the Bob Marshall Wilderness, several years in preparation, was implemented for the first time this summer. By the time you read this, the Scapegoat-Danaher plan, which encompasses 400,000 acres of wilderness, will have been tested by the 1981 fire season.■



Stalking the “Mountain Ghost”

by the Rev. Ron Johnstad
illustrated by Charles Fritz

DURING my senior year in seminary, I was given a form to fill out which, among other things, requested my personal choices for those geographical areas of the country where I believed I could best minister. When I received my first assignment and “Letter of Call” from a congregation, I was excited to find out I’d be moving to south central Montana, just north of Yellowstone National Park. I’d be serving two churches—one at Wilsall and the other at White Sulphur Springs, about 45 miles north of Wilsall on U.S. Highway 89.

For those unacquainted with Montana, these two towns are completely surrounded by some of the most fabulous mountain ranges in the West—the Big Belts, Little Belts, Bridgers, Absarokas and, my favorites, the Crazy Mountains. The Crazy Mountains stand guard over the lush Shields River Valley and Potters Basin, which extends through the town of Ringling northward to White Sulphur Springs.

The mountains are blessed with mule and white-tailed deer, cougars,

bobcats, coyotes, bears and, above all, the mighty elk, which roam freely through the endless miles of high country. Flowing from these mountains are numerous streams that eventually connect with the Yellowstone and Missouri. The clear, cold waters are alive with brook, brown and native cutthroats, which are often in the one- to three-pound class. It didn’t take me long to discover this was my kind of country.

As a youngster growing up in Pigeon Falls, Wisconsin, I had plenty of opportunity to hunt and fish. As a matter of fact, I would often grab my shotgun after school and walk through the woods near our farm in search of a squirrel, partridge, rabbit or whitetail. I’ll never forget the time I shot four slugs at a whitetail with my 20-gauge—from 30 feet. The deer was standing on its hind legs, eating bark or moss off the tree. I never came close to it and, finally, it gave up on me. It jumped over a fence and gave me a goodbye wave with its flashing tail.

I also had some great trout fishing. Many of the smaller streams in

Trempealeau and Jackson counties were filled with brookies. On several occasions, I caught brook trout 12 to 14 inches long. I have fond memories of fishing such streams as Big Slough, Upper Pigeon Creek and Vosse Coulee. With such a background, it’s little wonder that Montana grew on me so quickly.

When I think about my favorite outdoor recreation in Montana, elk hunting has to be at the top of my list. When fall comes and the aspen trees begin to change into their colorful garments, I start marching to the tune of the wild. The maps are brought out; my family becomes irritated by my constant chatter about hunting; my rifle is sighted in; I obtain permission from the landowner to hunt on his property, and my hunting partner is invited out to the house to go over the final plans.

At last, after many days of preparation and anticipation, the day arrives for the hunter to head into the mountains in search of the “mountain ghost.” Elk are often called “mountain ghosts” because they can spot a person a mile off—

and smell him at about the same distance. They can slip away faster than the blinking of an eye. One minute you'll see them, and the next minute they're gone. Even big bulls travel through dense timber with hardly a sound; they will lay their massive racks back on their bodies and sneak around timber as noiselessly as a cat.

What I've learned about elk hunting has come from two main sources: friends and experience. As I think about the truly great elk hunters I've known, surely Eddie Teller, a logger from White Sulphur Springs, has to be the first person who comes to mind. He's tallied more hours in search of elk and met with more success than anyone I know. Eddie and I have in common the fact that he also grew up hunting whitetails in Wisconsin. I'd like to share some of his secrets and some of mine with the readers.

* * * * *

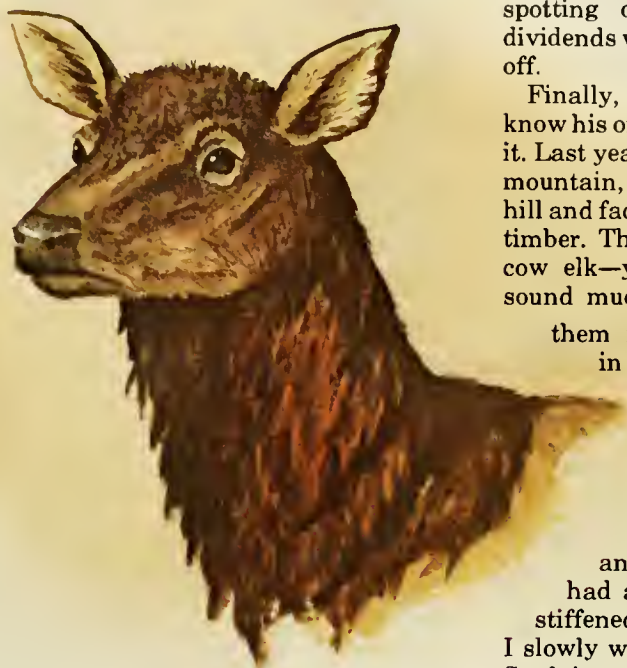
First, to hunt elk, you must get out of your four-wheel drive and stomp the hills. Surely, some people have been lucky enough to down an elk along a mountain road while they are in their vehicles. But none of the several elk I've shot in the last 12 years have been taken that way. I've had to track them and match wits with them in their own environment. That's the first lesson in elk hunting.

Second, the best elk hunting occurs when the weather is foul and fussy. Eddie heads for the mountains when the wind is blowing up a storm and the snow is swirling. He maintains that when the weather is bad, the odds of seeing an elk are increased tremendously. At times, he's gotten so close he could count their whiskers.

Eddie's advice has proved sound. I've had several similar experiences during foul weather. Once I came upon three cows and a calf. I couldn't believe it when they just stood there watching me. I could easily have taken any one of the four, but I could shoot only a bull in the area. On another occasion, during a whiteout, I got a nice five-point bull.

Third, when elk hunting, move slowly—very slowly. Don't hurry up and down the mountain. If you move slowly, elk are not as apt to spook on you and, with patience, you should

get a look at them. Take a few steps at a time, especially if you are on a track. Watch under the foliage for any movement of black because, chances are, you are looking at the legs of an elk. Elk may have greyish bodies, but their legs are distinctly black.



Fourth, remember that an elk is a curious animal—perhaps not as inquisitive as a pronghorn, but nevertheless curious. If you have broken a fresh track, go after it slowly and to the side. Check behind yourself, since an elk often circles around to see what's following it. Sometimes I've caught elk doing this by cutting off at a 90-degree angle away from the track. Once I had a huge cow almost walk over me. Another time, I missed a beautiful six-point bull with a massive rack. As I placed the cross hairs on his front shoulder and squeezed, nothing happened. My safety had frozen, and that was the last I saw of that magnificent bull.

Fifth, know your territory. For the last eight years, I've hunted the same area in the Crazy Mountains and I know it well. I know where the streams are, where the best hiding places are, where the best stands are, where I've seen elk before, where I've shot them and where they have run when they have been spooked. I put all of these things on a map and keep it up to date. Each year, before entering the woods, I review my map and

what I've noted down from previous hunts. I also keep track of the condition of the animals' food supply and any changes which might have occurred because of logging or other forest work. I try to get into the woods a couple of weeks before the start of the season so I can do some early spotting of the elk. It all pays dividends when the starting gun goes off.

Finally, a good elk hunter must know his or her rifle and how to shoot it. Last year, as I was creeping up the mountain, I came over the crest of a hill and faced a patch of dense, heavy timber. Then I heard the bark of a cow elk—yes, cows bark and they sound much like a dog. I've heard

them more than once barking in the woods. A bull elk either bugles or makes a sharp, three-staged, whistling noise. Soon I could smell the poignant fragrance of elk nearby and I guessed that the female had attracted a bull. My body stiffened with anticipation and I slowly went down on my stomach. Studying the terrain ahead, I saw the unmistakable movement of an elk's black legs. After determining the direction of its movement, I picked out a narrow space between the trees. I held my scope on the spot and waited. Pretty soon, I saw his rack glisten in the sun. Although it was about a 100-yard shot through heavy timber, I knew my 300-magnum could do the job. I squeezed, and the rifle shook my shoulder. I saw the bull drop and as I broke out of the thick timber—there he was, with his rack curled around a tree. I had placed the shot well; it entered the shoulder and dropped the bull in his tracks.

Knowing your rifle and what it can do—and cannot do—is extremely important for the elk hunter. Most of the elk I've shot have been in the 100- to 250-yard range. I've determined that sighting in at 200 yards is about right. Once you're confident the rifle is accurate at that range, it is equally important to be familiar with where the bullet will hit at greater and lesser distances. The only way to learn this is by shooting a lot. Try shooting at various dis-

tances and between narrow spaces—it will pay off in the woods.

* * * * *

These are some of the things I've learned about elk hunting from the professionals and from personal experience. Granted, you have to be in good elk country before you've got much of a chance. But with the few hints I've listed, and a lot of determination, you'll increase your chances considerably.

Elk hunting is tough work. You walk in high places from sunup until sundown. So, make certain you are in good physical condition before coming out West to hunt in the

mountains. Also, make sure you hunt with someone who knows the territory. Each year, we see articles about both experienced and inexperienced hunters becoming lost. Make sure you know how to read a compass, map and the sun and stars. Dress properly and carry a small pack with emergency supplies, extra clothing and dried foods.

If you see a guy out there in the woods with a checkered cap, a pack on his back and a smile on his face—chances are, you've run into me. If you do, say hello. But keep it quiet; you could scare the elk. Not even a preacher says much out in elk country.■

It began as a tribute to Charles W. Schwartz, as a showcase for some of his art, and to mark a 40-year career with the Missouri Department of Conservation as a wildlife biologist, cinematographer and artist. But even a glance through the book proves that its covers contain a great deal more than just another collection of someone's representative pieces.

There's a refreshing simplicity, partially because the selected drawings are reproduced as they should be. Among Schwartz's favorite media are brush and India ink, and pencil. What more accurate way to reproduce his work than in black and white?

There's a simplicity in the words, too. Editor Michael McIntosh is to be commended for proving that sometimes editing less is editing best. Perceptively, he has allowed Schwartz's words to appear much as they were spoken into a tape recorder. So, the words describe not only the species pictured, but they delve into how that particular drawing came into being. Some of the pieces are not new—they date to the 1940s and Schwartz's early years with the Missouri department. But the way he describes his subjects makes them seem very much alive, as if he sketched them a day or two ago. As John Madson writes in an introduction, none of the subjects' "grace" or "vitality" is lost.

Another remarkable aspect of the book is its appeal. A wildlife professional could find things in it that add to his or her knowledge. An artist could view it as an addition to the understanding of the ways of black and white, the coming together of brush and ink and paper, or of pencil and paper. Or, one could read the entire book to a child, and the child would be delighted and entranced because Schwartz's drawings and words are so easily grasped.

If there is anything the reader could want—besides Volume Two, that is—it would be an index. There is no comprehensive listing of the various drawings and the pages on which they appear. Also, a few of the black and white depictions are actually watercolors or have color washes. I found myself longing to see how Schwartz would handle such color.

For \$12, it's tough to match this posh, coffee table, cloth-bound marvel. Since its publication in late 1980, Schwartz and his wife, Elizabeth Reeder Schwartz (also a wildlife biologist), have retired and are living in Coeur d'Alene, Idaho. We can hope that a volume of his renderings of some of the species indigenous to the Northwest will be forthcoming.—Kay Ellerhoff, associate editor

Book Reviews

A BRUSH WITH THE WEST, by Dale Burk, Mountain Press Publishing Co., P.O. Box 2399, Missoula, MT 59806; 1980, 135 pages, \$19.95, cloth.

Those readers who have followed the history of *Montana Outdoors* from its inception in 1970 to the present should be observing a transition from an almost entirely photographically illustrated magazine to a showcase of western/wildlife art. I suppose it's only fair to say that our magazine has been caught up in the boom of western/wildlife art—a trend evidenced by greeting cards, limited edition prints, a maze of art galleries and publications throughout the Northwest, a great spurt in noteworthy auctions, such as the C.M. Russell or the Northwest Rendezvous.

If you're curious and find yourself wondering where it all started and why the overwhelming supply and demand of western/wildlife art today, consider investing in Dale Burk's "A Brush with the West." Not necessarily an expert, but a lover of the West's artistic heritage, Burk deftly traces the development of our artistic roots from the time of Lewis and Clark to artists of today.

Vivian Paladin, editor emeritus of *Montana, the Magazine of Western History*, says in her introduction: "Dale Burk sets out to explain the trend, trace its growth and assess its impact today....This is an analysis long needed."

But more than this, "A Brush with the West" is a study into the minds and feelings of those people who have chosen to record history for us, in a variety of media. To understand the heart of the person who controls the paintbrush is to grasp his or her

interpretation of our heritage.

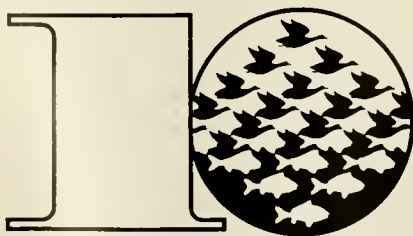
Burk also touches on the somewhat practical side of western art—what's authentic or fake, good or bad. Over 100 black-and-white photographs and 16 color plates provide examples of exceptional western art.

"A Brush with the West" is for those who feel they owe it to themselves to take a look at history not always through a textbook, but through the creativity of many gifted western artists.—Donita Sexton, art director

WILDLIFE DRAWINGS, by Charles W. Schwartz, edited by Michael McIntosh, Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102; 1980, 122 pages, \$12, cloth.

"Wildlife Drawings" is a publication remarkable for its simplicity.

National Hunting & Fishing Day®



10th. Anniversary/Sept. 26, 1981

Readers Respond

Beneficial Exchange

Approximately 15 years ago, my son, Richard H. Waltner, moved to Billings, Mont. One day while we were visiting, I was looking at his magazines and noticed *Montana Outdoors*. I was so impressed that I told him I would like to receive it. As a gift, he ordered a subscription for me, and I agreed to subscribe for him to South Dakota's *Conservation Digest*. This exchange has been going on for many years.

Now as to *Montana Outdoors*, and Montana as a whole. When we left Freeman, S.D., on our trip, we passed Belle Fourche, S.D., went through Lame Deer, Busby, Crow Agency and then of course on to Billings. I was at once impressed by the entire trip through Montana—the antelope, the great open spaces and, as we approached Billings, the mountains in the distance. Since my son and his family are great outdoors people, we spent most of our stay in the mountains, near streams and in the open prairie, hunting and trying to fish. We especially liked the mountains—the Pryors, Beartooths, the Snowy Mountains and the Bridgers—and the several trips to Yellowstone National Park. We'll never forget these trips—even our breakfast of bacon and eggs on the Stillwater. Then Emerald Lake, Red Lodge and up to a plateau where we saw a great profusion of blue flowers. I could go on and on how we enjoyed the spectacular scenery.

"There are 10 Candles on Our Birthday Cake" in your Nov./Dec. 1980 issue shows how much progress has been made since the magazine was first published—the paintings, photography and the various articles pertaining to wildlife, fishing, forestry, mining, etc., and what the future holds for upcoming generations. We in South Dakota are confronted with similar problems. Now it's the Mandan Line, from Canada to Nebraska, and uranium mining. Will the landscape be scarred to the point that all the beauty will be gone?

There is change already which can be noticed as one drives through the country. "The Sagebrush Rebellion: Who Owns the West?" in the same issue of *MO* states plainly what is happening. What can the states do?

Again, thanks to my son who introduced me to your magazine years ago. I hope that through the magazine many problems confronting the outdoors

can be solved. I hope due consideration will be given and that the sportsman will aid in keeping our land and forests from being decimated and that wildlife will hold its own for many more years, in spite of the fact that many species are on the endangered list.

Incidentally, my son now lives near Park City, Mont., from where we can see the snow-capped mountains, the clouds hovering over them and the beauty displayed when the sun shines on the snow.—*Richard Waltner; Freeman, S.D.*

Gopher-Eating Trout

After reading the letter from Warren H. Robinson of Boulder, Mont., in the July/August 1981 issue of *Montana Outdoors*, I decided to write you in reference to the three-pound brown trout that Mr. Robinson's son caught in the Boulder River several years ago. According to Mr. Robinson's letter, on close examination of this trout it was discovered that it had ingested two nine-inch gophers that were still clearly visible in the trout's stomach.

I know that many of your readers will find this hard to believe, and I really cannot blame them. But being a very truthful Boulder resident myself—as undoubtedly is Mr. Robinson—I want to verify his story and tell your readers that I personally saw this fish and found that after it was dressed out and cleaned, it weighed exactly minus three and one-half ounces.—*T.F. Duffy; Boulder, Mont.*

Transplant Sites For Peregrines

I just read the article on peregrine falcons in your Jan./Feb. issue of last year. The article said Montana may be able to take some of the peregrine chicks from Fort Collins as soon as biologists identify possible transplant sites. Would it be possible to plant some on the Sun River Game Range? It seems like a really good place to me. There are a lot of steep cliffs on the range and there are also quite a few game birds and smaller passerines.

Since peregrines like to nest near water, there is the Sun River and also Willow Creek Reservoir which has quite a few shorebirds. The area seems a long way from people, so the peregrines

probably wouldn't be disturbed. I have hunted there, but I have never seen a peregrine. But I have seen prairie falcons. Do you know if there are any peregrine or prairie falcons nesting there now?

Peregrines are my favorite birds and I would really like to see more of them here in Montana.—*Brian Mutch; Missoula, Mont.*

• *There are no plans to put peregrines on the Sun River Game Range in the near future. However, the area would be considered, along with several others, when birds for reintroduction become available: Prairie falcons nest on the Sun River, but there are no known nesting peregrines.—Ed.*

Fitting Tribute

I was sorry to read of Joe Halterman's passing away in the July/August 1981 issue of *Montana Outdoors*. I can attest to the tribute given Joe, as I replaced him as game warden in Roundup in May of 1941. As I recall, Joe went to Kalispell to replace Archie O'Claire who was transferred to Helena as deputy-at-large.

I have had many friends in the department over the years—Archie, Bob Cooney, Bill Voorhies, just to mention a few. My dad was sporting goods manager for Holter Hardware for 35 years and, as a result, we "grew up" with the Fish and Game.

I am now enjoying my retirement here in California where I hunt and fish with my son and two grandsons.—*Ben Wahle; Burlingame, Calif.*

Words Are Not Enough

Having been born in a log ranch house on the bank of the Kootenai River about two miles west of Libby, I feel that Montana is my birthright. My late uncle, Ed Boyes, was chairman of the Fish and Game Commission years ago and through him I was introduced to *Montana Outdoors*.

I don't have enough words to tell you how much I have enjoyed your informative articles and the beautiful photography and artwork that appear in every issue.

Montana Outdoors has to be the best publication of its kind in the country.—*Jerry Pratt; Federal Way, Wash.* ■

Recreation Survey *continued*

Montana residents 18 years of age and older during six weeks beginning in May 1980. The bureau has developed a random telephone sampling system which it has used in other surveys with statistically significant results. Bureau personnel have found this method better than personal interviews or the mail approach because it costs less and consumes less time. Also, there are no reliable lists of all Montana households or residents from which to select a sample for personal or mail contact.

Sampling was conducted in two stages: Households were selected first, using the bureau's random sampling system; individual respondents were then randomly selected from among the eligible adults in those households. Random sampling procedures were followed to ensure that every person had a chance to be selected and that the sample was representative of the Montana population from which it was drawn.

Of the approximately 1,700 persons subsequently selected at random from the eligible households, about 73% responded, resulting in 1,237 usable interviews. According to the bureau, this response rate compares favorably with other surveys of this type, and results are reliable at the 99% confidence level for the entire statewide sample. Reported percentages do not always total 100% because of miscellaneous responses, no responses, etc.

FISH

Nearly 70% of the respondents indicated they fish in Montana, and about 59% said they had fished during 1979. Overall, 59% preferred to fish in streams and rivers; about 32% favored lakes and reservoirs, and another 9% mentioned sites such as ponds. People in western Montana preferred streams and rivers, and eastern Montana residents favored lakes and reservoirs. This trend probably reflects the geography of Montana, with streams and rivers more accessible in western Montana, and reservoirs more convenient for those living in the eastern prairie region.

In terms of limits, Montana fishing enthusiasts overwhelmingly preferred to catch a few large, rather than many small, fish. The pattern of responses to this question, about two to one in favor of fewer but larger fish, was remarkably stable among the department's administrative regions and multicounty groups. Also, the more avid fishermen strongly preferred larger fish.

About 51% of all respondents (not just fishermen) thought the DFWP should provide more fishing access sites during the next five to 10 years. Thirty-seven percent said there were enough such sites, and the remaining 13% had no opinion or gave no other response. The proportion of respondents who desired more access sites was highest in southwestern and south central Montana and lowest in north central and northeastern Montana. Urban dwellers favored additional access sites more strongly than did those living in rural areas and, not surprisingly, additional access sites were most popular among fishing enthusiasts.

Among those who ever do any fishing in Montana, nearly 43% said they favored increased emphasis by the DFWP on

warm-water fishes such as walleye, northern pike and bass, but 46% opposed more emphasis. Those living in eastern Montana strongly favored more warm-water fishing, and three-fourths of these respondents said increased fishing license fees should be used to finance any expanded warm-water fishing program. When asked if they favored this expansion if it meant reducing the cold-water (trout) program, 42% still favored the expansion, but almost 49% were opposed.

Efforts by the department to protect fish habitat by maintaining minimum stream flows, protecting natural stream channels and similar activities were strongly supported by about 90% of the respondents. Nearly as many felt that subdivision activities along rivers with high fishing or recreational value should be controlled.

On the issue of regulating the use of popular streams and rivers during periods of high use, about 49% favored such regulation and 41% were opposed. Of those approving such regulation, the state was strongly favored as the regulatory authority.

When asked about raising fishing license fees to cover the increasing costs of fisheries programs, about 72% of those responding favored such an increase. Respondents were also queried about the current practice of using hunting fees to fund a sizable portion of the fisheries program. Specifically, they were asked whether or not they favored increasing fishing license fees to fully fund the fisheries program. Overall, about 49% said they favored such an increase, while 32% were opposed. Interestingly, about the same proportion of hunters and fishermen favored or opposed this proposal.

WILDLIFE

Over one-third of the respondents said they did some hunting in 1979.

When asked whether the number of *resident* hunters should be limited, about 37% of all respondents favored a limit, but 48% were opposed. Roughly 57% of the hunters were opposed to such limits, and only 29% were in favor. The greatest support for restricting resident hunters came from eastern and central Montana, but opposition to such limits was greatest in western Montana where opponents outnumbered supporters almost two to one.

More than 86% of all respondents favored a limit on *non-resident* hunters. Of those favoring nonresident restrictions, over half preferred a lower limit than the current 17,000 nonresident big game licenses; 32% favored no change in the limit, and only 1% wanted an increase. A lower limit on non-resident hunters was preferred by more hunters (63%) than nonhunters (52%).

Respondents who favored lowering the nonresident limit also favored an increase in resident hunting fees by more than a two-to-one margin to make up for lost nonresident license revenue.

When asked about paid hunting and fishing on private land which might open some additional land to access, respondents were almost evenly divided, with 47% approving this practice and 44% opposed. Looking only at those who hunted in 1979, 59% were opposed to paid hunting. About 65% of the hunters and 51% of the nonhunters were against state encouragement of paid hunting and fishing.

The survey also sampled public opinion about private game farms where game animals are grown for meat or other products and people pay to hunt. About 49% of all respondents opposed this type of operation, but about 38% approved. Opposition was greater among hunters (54%), but regardless of their general feelings toward game farms, 71% of all respondents thought game farms should be regulated by the state.

A few questions were asked about nongame and endangered

• *The Department of Fish, Wildlife and Parks gratefully acknowledges the efforts of the University of Montana's Bureau of Business and Economic Research in the design and conduct of this outdoor recreation survey. Specific thanks go to Bureau Director Maxine C. Johnson, for preliminary work on project initiation. Survey design, conduct and completion fell under the very capable leadership of Susan Selig Wallwork and she, along with Mary L. Lenihan and Paul E. Polzin, provided the analysis.*



species wildlife programs. Respondents opposed any increased emphasis and funding for nongame wildlife by about four to one (72% vs. 17%). Opposition was greatest in rural parts of the state, and more hunters than nonhunters were opposed. Interestingly, of the 17% in the entire sample who favored increased funding for nongame wildlife, about 89% liked a procedure where people could donate part of their state income tax refund to such programs.

On the issue of DFWP land acquisition for wildlife management purposes, about 53% of the respondents favored the program and 34% were opposed. About 49% of the non-hunters and 60% of the hunters said such purchases should continue, and the approval rate was more than 66% among persons who hunted for over 30 days in 1979.

A large majority of all respondents (69%) favored increased hunting license fees to cover increasing costs of wildlife management programs. About 64% of the hunters favored increased fees, compared to 71% of the nonhunters. Most

respondents who favored higher fees thought both resident and nonresident licenses should be increased (60%), but 35% felt only nonresident licenses should be raised.

PARKS

Generally, the most popular recreation activities in Montana in 1979 were the most sedentary—picnicking, driving for pleasure and walking for pleasure. Over 70% of the respondents reported doing each of these activities at least once in 1979. Younger respondents showed higher participation rates, especially in the more vigorous activities. Bird-watching, driving or walking for pleasure and picnicking were activities which showed relatively greater participation by those 65 years of age and older. Fishing and hunting license holders were more likely than nonholders to have participated in every activity listed.

A clear majority of the respondents—nearly 63%—said the fuel situation (rising costs and availability) would affect their outdoor activities in some way. License holders were significantly more likely than nonholders to expect that the fuel situation would affect their recreation activities.

About 46% of the respondents indicated that recreation services and programs should be funded by user fees, while 28% preferred funding from the state's general fund.

Nearly 80% of the respondents said they had visited a state or federal park or recreation site in Montana during the last five years. Those in northwestern Montana were more likely to have visited such a site than were respondents in southeastern Montana. Urban residents and license holders were also more likely to have visited a site.

Over half of the respondents reported between one and five visits to a state or federal park or site in 1979; 13% recorded between six and 10 visits, and about 12% said they had made over 10 visits.

Of those who said they had visited a state or federal site since 1975, about 49% said they had visited a *state* site in 1979. However, few could accurately name a state park or recreation area.

Respondents were asked if, thinking ahead to the next five or 10 years, the state should purchase land for new or expanded park or recreation sites. About 46% favored the idea, while 44% were opposed.

If additional sites are developed, about 41% of the respondents said such new sites should be located closer to the state's larger population centers. Respondents were also asked what type of recreation sites and parks they would prefer, if additional state facilities were provided. About half of those who answered said such sites should include camping and picnic areas; fishing access was mentioned by 41% of the respondents.

Respondents were asked, in general, what their feelings were regarding the state's maintenance of its parks and recreation sites. Over three-fourths of those responding said the state does a "very good" or "good" job.

RELATED ISSUES

Landowner/Recreationist Relations

The potential for conflict between recreationists and landowners is one of the most important problems in resource management. Respondents were asked questions designed to gauge the extent of the problem and also to examine the issues from the perspective of both landowner and recreationist.

No less than 90% of the respondents agreed that conflicts definitely exist between landowners and those who use private land for recreation. About 26% of these respondents said the conflicts were "very serious"; 52% said they were "serious," and about 17% said "not too serious." Both hunting and fishing enthusiasts thought the problem was more serious

than did persons who did not participate in these activities.

About 24% of those responding indicated they had experienced a problem or friction with a private landowner about access to hunting, fishing or recreation sites. Urban dwellers, hunters and fishermen experienced such problems much more often than did others, and more hunters (39%) than fishermen (31%) reported experiencing a problem with a landowner.

To analyze both sides of the problem, landowners in the sample were asked about their experiences with recreationists. Twenty-three percent of the respondents said they had land which is or could be used for hunting, fishing and other recreation. More than one-half (54%) of these landowners reported friction or problems with recreationists regarding access to or through their land. Eastern Montana landowners experienced such problems much more than did their western Montana counterparts. When asked about the frequency of problems with recreationists, 32% of the landowners said they occurred "very often"; about 35% said "sometimes," and about 29% said "not too frequently."

As a possible approach to reducing friction between landowners and recreationists, a state program to negotiate long-term easements across private land in order to reach public land received overwhelming support from the respondents—more than 75% favored such a program. About 81% of the fishermen and 84% of the hunters favored it, and 71% of the landowners liked the idea. Over half (58%) who favored the program said it should be paid for through increased hunting and fishing fees paid by the actual users.

Another alternative for improving relations with private landowners could include providing them with a financial incentive for maintaining wildlife habitat and allowing public access. Sixty-one percent favored this proposal, and about one-third disapproved. Among sportsmen, 64% of both the fishermen and the hunters favored such a program. The proposal was also popular among landowners, with 62% registering support. On the question of funding financial incentives for landowners, about 53% of those favoring such a program said fishing and hunting fees should be raised to cover the costs.

Use of Water—Energy Decisions

A series of questions dealt with priorities for use of Montana waters and the role of the DFWP in decisions made by the state concerning energy-related activities.

Only 8% of the respondents believed that fish and wildlife should have the highest priority for use of Montana waters. Instead, about 42% said agriculture should also receive first priority along with fish and wildlife, and about 37% replied that water should be equally available for all uses, including industrial.

Energy-related developments such as coal mining and oil and gas exploration could affect fish and wildlife habitat in some areas of the state. Respondents overwhelmingly stated (83%) that the DFWP should be involved in energy-related decisions to assure consideration for fish and wildlife habitat.

Enforcement

Several questions dealt with enforcement of fish, wildlife and parks regulations. Overall, the majority of respondents (61%) said the department presently provides adequate enforcement, while 25% believed enforcement efforts should be increased.

Respondents were almost evenly divided in their opinions concerning the number of enforcement personnel in the field. About 38% said more enforcement personnel are needed, while 43% said there were currently enough.

Alternatives to hiring additional enforcement personnel include providing more public information about regulations,

emphasizing penalties for violations and encouraging people to assist in enforcement by reporting violations they observe. Those responding clearly preferred that more emphasis be placed on reporting of violations by the public. Forty-one percent preferred this approach, while about 23% favored more public information about the regulations, and 18% preferred increased emphasis on penalties for violations.

As another approach to enforcement, DFWP field personnel other than game wardens have received training and authority to enforce fish, game and parks regulations under the "ex officio" program. Respondents strongly supported this approach (75%), particularly fishermen (80%) and hunters (81%).

DFWP maintains a toll-free telephone number for public use in reporting fish, game and parks violations and landowner problems. Respondents overwhelmingly approved this concept, with 90% in favor.

Conservation Education

Conservation education for young people may help foster more responsible attitudes among adults toward fish and wildlife. Even more specifically, some people believe that students in Montana's public elementary schools should take a course in conservation education that would cover fish, wildlife and plant life and their relationships to their environments. Survey results suggest considerable support for this idea, with nearly 78% indicating approval.

Outdoor Recreation Information

The survey also attempted to learn where people obtain their information about fish and wildlife, the outdoors and outdoor recreation. About 58% of all respondents indicated they relied on "word of mouth" information from friends, family, work associates and other community members more than any other source. Other frequently mentioned sources included newspapers (42%), magazines (33%), television (33%), government agencies (14%) and radio (13%). When asked in which source they placed the most confidence for information about outdoor recreation, respondents again cited "word of mouth" by a large margin (36%). Of the other sources mentioned, only newspapers and magazines were cited by at least 10% of those responding.

Montana Outdoors, the official DFWP bimonthly publication, is apparently well-known among Montanans. Almost 89% of the respondents acknowledged seeing *MO*.

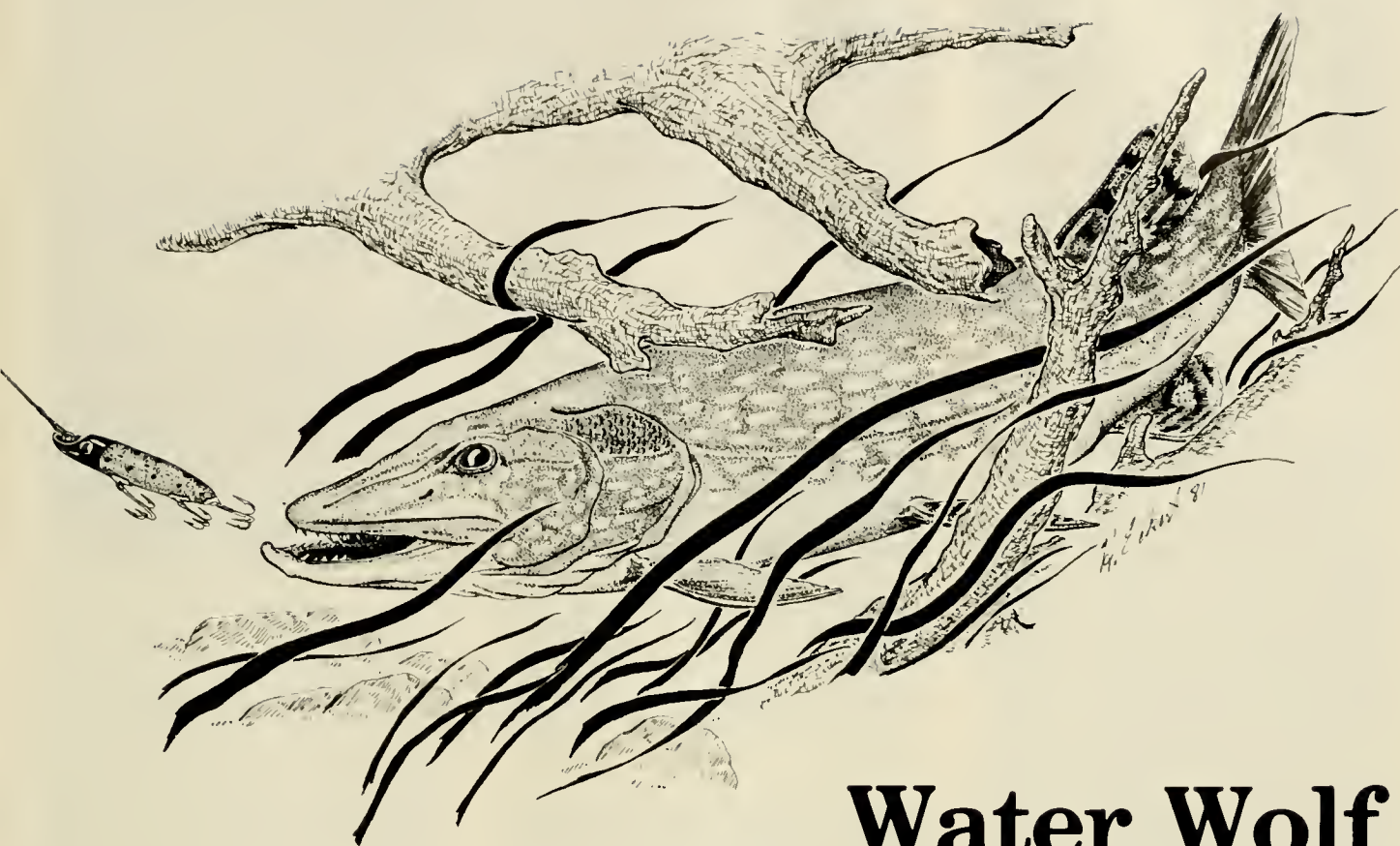
Finally, one question asked specifically about the department's overall performance, all things considered. Statewide, about 71% indicated the department's performance was "good"; 11% said "excellent," and 13% said "fair" or "poor."

THE FUTURE

The business of managing and perpetuating Montana's wildlife has come a long way in the last 40 years. In addition to fish- and wildlife-related responsibilities, the department now has the broad mandate to oversee all forms of outdoor recreation in the state. Considering the increasing number of people, intensifying pressures on Montana's land base and inflation, the 1980s are bringing about challenges greater than ever before.

To meet the changing demands of the future, new and innovative programs are necessary, because you—the outdoor-oriented citizens of this state—demand a cost-conscious department aware of the needs and desires of its constituents.

Armed with the information gained by this survey, we hope to meet the future with effective programs which provide for and preserve something of what you and I have known in the past. To a large extent, our success in this venture will depend on your help and understanding. ■



Water Wolf of the Weed Beds

by Ken Walcheck
illustrated by Harvey Eckert

JACKFISH III is near retirement, or probably should be. Like many other favorite things in life, there comes that final day.

Jackfish III is a tried and true handmade northern pike fishing plug that resides in my tackle box. Carved from basswood and armed with razor-sharp treble hooks, he was designed to entice and catch lunker northern pike. Jackfish I and II were also northern pike plugs long since retired.

Jackfish III's declining health began the day he was ferociously attacked and mutilated by a ravenous three-foot pike in a remote lake in northern Saskatchewan. Part of the problem was that Jackfish III, like his predecessors, took his job too seriously.

The "accident" occurred late one afternoon when Jackfish III was darting in and out of a floating garden of lily pads. When the pike's mouth closed on the wooden plug with a resounding "chunk," I feared the worst. My fears were realized when I inspected the plug and saw the gaping fracture. This "weakness" proved to be Jackfish I-III's only real fault and the thing that separated them from greatness. They simply couldn't take too many knockout punches—that's one of the hazards if you're a fishing plug made of soft wood.

Some people have little regard for members of the pike family. I don't agree with them. Maybe it's because my roots go deeper than theirs in understanding the pike clan.

One of the largest fishes in North America, the northern pike has been exquisitely designed by nature. In appearance and versatility, it doesn't have to take a back seat to any of Montana's game fishes. Indeed, its specifications read like a streamlined version of a barracuda:

- Goes by several aliases: jackfish, jack, hammer-handle, northern, slimer and pickerel. Circumpolar distribution in the Northern Hemisphere. Wickedly toothed, tricky, haughty and arrogant. Savage and aggressive one moment, sultry and sneaky the next. When hooked, a tackle-busting tornado that can demolish a fishing rod as quickly as a snap of the fingers. Superb eating, especially when filleted and cooked flaky-white in bacon fat. continued

- Prolific, fast-growing, with a ravenous appetite; cannibalistic carnivore with sharp canines and short, rearward-pointing, roof-of-the-mouth stilettoes that eat virtually any living vertebrate within the size range he can engulf. In a supreme demonstration of gluttony, he will sometimes choke to death.

- Duck-billed and barracuda-shaped, with the sinister gaze of a street corner lurker. Camouflaged like a jungle guerrilla fighter, with a dark green head vermiculated with bright golden marks. Flanks lighter green, conspicuously marked with longitudinal rows of yellow to whitish bean-shaped spots. Cream to milk-white fingers projecting up from a white belly.

Despite his lofty stature with some anglers, the titular head of the family Esocidae is not well liked by others. In fact, he has been a source of misunderstanding for centuries. Admittedly, the pike with his baleful eyes and underslung jaw is not a species to instill confidence. He's not your typical household pet, and coming up with a captivating smile is not one of his long suits.

Fossil records for the pike family in Eurasia date to the middle Eocene Epoch (47 million years ago) to recent; in North America, records date from the Pliocene Epoch (1 million to 12 million years ago) to recent.

Probably no species has inspired more fables than the pike. His malevolent eye and tail-drooping posture once caused him to be known as Luce, the water wolf (hence his scientific name, *Esox lucius*). Of course, the pike's habit of devouring a damsel's pet ducklings and goslings didn't enhance his reputation either. Anglo-Saxons likened him to an ancient weapon, the war pike. During medieval times, the pike's grim visage nurtured numerous myths and medical practices. Pike were depicted in medieval literature as attacking a wide spectrum of animals ranging from turtles to humans. Pike were also a source of specific organs used as medicines: Pike heart and gall, it was thought, reduced fevers; pulverized jawbones "cured" pleurisy, and the ashes of pike reportedly hastened the healing of body wounds.

Other myths during this early era focused on the pike's age and weight.

European reports of ancient pike weighing over 100 pounds are largely fanciful and in the same category as tales of pike that pulled mules and milkmaids into ponds. The most famous is perhaps the Emperor's Pike which was caught at Wurttemberg (present-day Germany) in 1497. The 19-foot pike, weighing 550 pounds, was said to have had an engraved copper ring around the gill region that told of its release 267 years earlier by Emperor Frederick II. The preserved skeleton, however, was found to contain the vertebrae of several different pike.

Because of past difficulties in authenticating records, the water is muddy in reference to the world record. The North American record for northern pike is 46 pounds, 2 ounces. The fish was caught in Sacandaga Reservoir, New York, in 1940—its accelerated growth a product of a new and fertile impoundment. Montana's record northern, 37 pounds, 8 ounces, was caught by Lance Moyler in 1972 in the Tongue River Reservoir.

The northern pike occurs in North America from Alaska and eastward across Canada to the Atlantic Ocean. In the continental United States, populations are found as far south as New York, the Great Lakes, the Ohio Valley, Missouri, Nebraska and Montana. Pike have also been stocked in scattered waters in many other states.

As reported by Dr. C.J.D. Brown in "Fishes of Montana," northern pike are native to Montana in the Saskatchewan River drainage. The earliest known collection occurred in 1874 from the St. Mary River. According to Nels Thoreson, supervisor for the department's Great Falls region, the earliest stocking of pike in Montana was into Pike Lake (north of Babb and west of the St. Mary River) before 1940. It remains questionable as to who stocked the fish. According to the story related to Thoreson, the fish were planted by Canadians, perhaps as a scheme to promote a Canadian railroad. Subsequent plants in other waters in north central Montana during the early 1940s were transplants from Pike Lake or progeny of Pike Lake fish planted in other waters. Since then, pike have been propagated at state and federal hatcheries and planted in

numerous lakes and streams.

West of the Continental Divide, northern pike have occurred primarily through unauthorized introductions. Even though they provide excellent recreational fishing in the northwestern part of the state, some associated problems have surfaced. Delano "Laney" Hanzel, a department fisheries biologist in the Kalispell area, has documented at least 36 unauthorized introductions of northern into streams and lakes in northwestern Montana. In some lakes, such introductions represent a threat to native fish populations and also pose problems for fisheries managers. Whitefish and Echo lakes serve as excellent examples of spots where native lake whitefish have been seriously impacted by the introduction of pike.

Northern pike spawn in early spring as soon as the ice goes out. During the spawning run, the larger female is usually attended by one or two smaller males. During the spawning act, the sexes roll together in shallow water and eggs and milt are discharged at the same time. While photographing waterfowl one early spring on Medicine Lake in northeastern Montana, I observed a pair of spawning northern rolling in about eight inches of water. At the end of each spawning act, I observed a violent thrust of the tail, which presumably scattered the eggs, and a wake as the pike rapidly moved away.

The female is prolific in her egg laying and deposits from 10,000 to 100,000 grapesized-sized eggs depending on her size and age. Once discharged, the eggs attach themselves to vegetation. According to one authority, over 50% of the eggs are fertile, but the survival rate is quite low. A Michigan study on survival rates of young northern pike for a specific habitat estimated that for every 1 million eggs laid, only 1,800 left the spawning grounds—a mortality rate of about 99.8%. Death appears in many forms: It may pounce suddenly with open jaws from a weed bed or creep in slowly and agonizingly as a parasitic tapeworm, an insidious fungus infection of the gills, or low water levels. In some states where northern are important game fish, adults are trapped in their spawning areas and stripped of their



Hiram Mahoney caught this 28-pound, 4-ounce northern pike while fishing off the face of Fort Peck Dam from Fort Peck Reservoir. He caught the big fish on Sept. 12, 1974, using a minnow as bait. The northern measured 45½ inches long and 21 inches at its greatest girth. It is the largest documented northern pike taken in open water from Fort Peck Reservoir. (Larger fish have been caught through the ice.) The state record northern—37 pounds, 8 ounces—was taken in 1972 by Lance Moyler who was then 9 years old. Moyler caught his record pike while angling in the Tongue River Reservoir just north of the Wyoming border (DFWP photo: Mike Aderhold).

eggs and milt. Fish culturists can be much more effective in producing pike than can scattershot pike parents.

Reproductive success of the northern pike in some of Montana's better fishing waters depends essentially on shallow, flooded areas with vegetation to which the fertilized eggs adhere until hatching. This basic requirement has posed a major obstacle to development of pike populations in many reservoirs. Fluctuating water levels because of the seasonal water cycle and, in some reservoirs such as Fort Peck, operation of the reservoir pool for hydropower, irrigation and navigation purposes provide a relatively poor environment for establishment of shoreline terrestrial or aquatic vegetation during the short growing season. Steep, erodable shorelines around some reservoirs, as well as detrimental effects of strong wave action, also contribute to a precarious existence for shallow water and shoreline plants.

A classic example of the impacts of a fluctuating reservoir on a northern pike population was documented by department fisheries biologists on Fort Peck Reservoir in

the early 1960s. Although northerns were planted in the reservoir in 1951, it was not until 1960 that a pike population became firmly established. However, the population was not large enough to be of significant interest to sport fishermen. Creel census reports from more than 1,500 angler trips to Fort Peck Reservoir between 1952 and 1962 reported the taking of only one northern pike.

In July 1960, a severe drawdown of Fort Peck Reservoir began and, by March 1962, the water level had dropped 27 feet. Pike reproductive success also waned because of a lack of suitable spawning grounds.

Montana's Pike Picks

Northwestern—Lonepine Reservoir, Echo Lake, Stillwater River

North Central—Lake Frances, Tiber Reservoir, Pishkun Reservoir

Northeastern—Nelson Reservoir, Fort Peck Reservoir, Fresno Reservoir, Medicine Lake

Southeastern—Tongue River Reservoir, the mouth of Hanging Woman Creek on the Tongue River

During the summer of 1963, the reservoir had recovered 25 feet of its former water level and the stage was set for the establishment of an excellent northern pike fishery. During the spring of that year, northerns had excellent spawning success because of flooded shoreline vegetation. Spawning conditions further improved in 1964 when the water level increased by another 20 feet. In 1965, water levels went up another 10 feet, several hundred thousand acres of vegetation were flooded and northerns enjoyed a third good year.

Superb pike fishing blossomed for the first time at Fort Peck in the fall of 1965 to the surprise and delight of Montana anglers. Between Nov. 29 and Dec. 24, 1965, anglers at one site caught more than 300 northerns. Between 1967 and 1969, several national outdoor magazines told about 20-pound lunkers being caught in Fort Peck Reservoir. Since then, northern pike reproduction and angler success have paralleled the ups and downs of water levels.

Jim Liebelt, former commercial fisheries biologist for the department and now the department's information officer for northeastern Montana, adequately sums up the northern pike fisheries problem in Fort Peck Reservoir. "It should be pointed out," says Liebelt, "that there is no substitute for natural reproduction, especially in a huge reservoir such as Fort Peck. Although hatchery plants of northern pike will provide a few fish to the creel, it is not economically feasible or even possible to plant the huge numbers required to maintain a good sport fishery for this species."

At least for the Tongue River Reservoir in southeastern Montana, a partial solution to water fluctuation problems was construction of a pike-rearing pond. Through cooperative efforts of the Decker Coal Company, the Department of Fish, Wildlife and Parks and Montana State University, a 15-acre rearing pond, utilizing waste water from the Decker mine, was constructed in 1978. Although the pond was initially plagued with drainage and water stabilization problems, tangible results began to show up in 1980. In 1979, more than 5,000 fingerling northern pike were taken from the

rearing pond, fin-clipped and placed in the reservoir. When fisheries personnel used gill nets to sample the reservoir the following year, almost 90% of the pike captured were the fin-clipped northern. Anglers were also reporting good catches of yearling northern. Because of the program's success, nearly one-half million fry were placed in the rearing pond during spring of 1981.

In terms of selecting food, the northern pike would have to be classified as an opportunist. Although the adults' diet is over 90% fish, it is supplemented with frogs, snakes, mice, muskrats and other unfortunate creatures that happen to be swimming or haphazardly fall into the water near a pike. The total mass of protein consumed is staggering: One authority estimated that it takes from five to six pounds of food for each pound increase in the body weight of a northern pike. Couple this figure to the potential maximum weight for a northern and you have an idea of predation by this species on the other vertebrates in its habitat.

When it comes to demolishing fishing tackle and turning an angler's hair grey, most veteran plug casters agree the northern pike ranks near the top of the list. In recent years, many fishermen have realized the northern can be a spectacular fighter, capable of line-burning runs and, if in the mood, some pretty spectacular jumps. Pound for pound, I'll stake the fighting ability of a northern against any game fish. For many anglers, he's the marlin of inland waters.

One unique aspect of a northern's behavior is the tendency to regain strength when he nears the boat or when the dip net is placed in the water. I've hooked large pike that came in like waterlogged old shoes, but after getting close to the boat, they would tear away in long runs and soar out of the water with head-shaking, splayed-gill ferocity. It's this last-ditch explosiveness that causes the angler to shake his head in disbelief. This is also the time when most tackle is broken and unprintable vocabulary is exercised.

Pike are taken on every conceivable kind of tackle, from fly rods to heavy saltwater gear. The traditional outfit is usually a 5½-foot bait-casting rod or a 6½-foot spinning rod. The rod

should have plenty of backbone; the reel should have smooth-running drags capable of slowing the fast runs of large fish while placing minimum strain on the tackle.

From 12- to 20-pound test line is advisable, due to the size of the fish you could encounter. Pike tend to roll in the water when hooked, wrapping the line around their bodies and placing a lot of strain on it. A 12- to 18-inch wire leader is also necessary to prevent the pike's sharp teeth from severing the line. Large metal spoons, spinners with bucktails, top-water plugs and darter plugs that run a foot or so under the surface are consistent pike producers. Other favorites include a wide assortment of jointed underwater plugs, rapala-type plugs, pork rind variations and noisy surface lures featuring propellers, flaptails and chugging heads. Magnum-sized plugs are recommended for trophy-sized northern. If you're a bait fisherman, large live minnows, suckers and smelt can be extremely effective when trolling or still-fishing.

Anglers are often frustrated by large pike that repeatedly trail lures to the boat, yet fail to strike. Swishing the rod tip below the surface and moving the lure in a figure 8 pattern sometimes will trigger a strike.

The best spots to search for pike are protected bays, weed beds, creek mouths and other spots where you are likely to find lily pads, stumps and brush piles. Sometimes, unlikely looking areas produce big fish. A couple of years ago, I was fishing for smallmouth bass at the mouth of Hanging Woman Creek on the Tongue River in southeastern Montana. Bass fishing was extremely slow, so I switched to a large red and white surface plug. On my first cast, a northern swirled and clamped down on the plug. Although we didn't have a scale, we estimated that it weighed between 12 and 15 pounds. Generally, females are the lunkers.

Spring and late fall are the best times for pike fishing. Summer is generally less productive because of increasing water temperatures. As weeds grow, pike use vegetation as hiding spots from which to ambush their prey. They especially favor outside-edge vegetation where there is a sharp drop-off into deeper water. They also like channels and open pockets in weeds. When it comes to

patience, most anglers could take a lesson from the northern pike. He will remain motionless for long periods waiting for a fish to swim by. Like the great blue heron, he is a study in absolute concentration. Usually he will be wholly or partially hidden by submerged vegetation or brush. When away from his cover, he will hang below the surface or rest on the bottom, tilted to look like a log.

It is difficult to visualize how fast a northern can strike his prey. My most vivid encounter just about cost me a friend. In fact, I don't think friendship's full bond has been restored since the northern pike incident in the Miles City regional office. One of my colleagues was carefully nurturing a six-inch pike that he had named "Rocky." It was a real experience to watch Rocky work over his prey—usually a minnow or two placed into the aquarium. Sometimes the strike of the small pike was so fast that if you blinked, all that would be left of the minnow was a few delicate scales sinking softly to the aquarium bottom. At other times, Rocky would move slowly and contemplatively, rising from the bottom without moving fins, gills or tail. Watching him too long was hypnotic and tempting. Too tempting. I happened to have a miniature daredevil lure in my desk drawer. Tying a piece of string to the lure, I barely dipped the lure into the water—and wham! I had not only hooked Rocky, but my involuntary reaction was such that I pulled up and yanked Rocky out of the tank and onto the floor. And there he died. You know, my friend did not seem to appreciate it when I told him the "short course" in fish behavior provided by Rocky was an extraordinary learning experience.

There aren't too many guarantees in life, especially when it comes to fishing. My memory bank, however, constantly reminds me of the good times I've had fishing for northern pike. When I close my eyes, the memories drift through my mind as softly as sand grains in an hourglass. Some say you have to be a little crazy to fish for jacks. That may be so, but when I think of some of the tackle-busting tornadoes I've hooked, and the smell of pike frying in the skillet over an open fire, I can only come to one conclusion: If you have to be a little crazy to fish jacks, then I don't want to be entirely sane. ■

Contributors

• Lead poisoning is responsible for an annual loss of about 2 million ducks, geese and swans in North America. The solution to the problem—substituting steel shot for lead—has been a source of great controversy among waterfowlers over the past decade. This question has placed “Montana Waterfowlers at a Crossroads.” Writer **Don Childress** is the statewide waterfowl coordinator for the department; he also manages the Freezout Lake Wildlife Management Area. A sidebar to his article explains the flyway system—a grouping together of states with a common interest in particular waterfowl populations. Turn to his article on page 2.

A painting of Canada geese by **Jim Wantulok**, Bozeman, illustrates Childress’ article. Wantulok has had one-man shows in Montana, Washington, Oregon and Texas, and his work appears in galleries in several states. For additional information about his work, contact him at 1907 S. Tracy; Bozeman, MT 59715.

• In the summers of 1978, 1979 and 1980, an estimated 107,590 waterfowl were lost to botulism in the Central Flyway portion of Montana. As **Charles Eustace** writes, surveillance of known botulism-producing areas can help detect outbreaks in early stages and minimize the deadly effects of “Botulism: Grim Reaper of the Marsh.” Eustace is the wildlife manager for the Billings region; he previously worked as a wildlife biologist in Miles City. Turn to his article on page 6.

The etchings illustrating the botulism article are by **Jeff Walker**, Cascade. A full-time artist, Walker has participated in several western art auctions and chooses Montana game birds for many of his etchings and paintings. For additional information about his work, contact him at Route 1 South, Box 98; Cascade, MT 59421.

• If you’ve ever driven Highway 12/287 between Helena and Townsend, you have probably spotted a few antelope. To learn more about this herd’s history and future, turn to **Joe Egan**’s article, “Urban Expansion and Antelope,” on page 9. Egan is assistant administrator of the Wildlife Division.

The pencil sketch illustrating the article was done by **Ralph Krieg**, Helena. Recently retired from the Montana Department of Revenue, Krieg enjoys spending his leisure hours in outdoor activities. For additional information about his work, contact him at 1225 Hudson; Helena, MT 59601.

• What some 1,700 Montanans think about current and future programs of the Department of Fish, Wildlife and Parks is summarized in “Recreation Survey Reveals Attitudes.” For example: About 72% of those surveyed favored an increase in fishing license fees to cover increasing costs of fisheries programs. For more survey results, turn to the article by **Steve Bayless** and **Susan Selig Wallwork** on page 13. Bayless is the administrator of the Conservation Education Division. Wallwork is research associate with the University of Montana Bureau of Business and Economic Research.

Mitchell Paulson, Helena, created the graphics accompanying the article. He has experience in scientific illustration and commercial art and is part owner of a commercial graphics firm in Helena.

• As far as wildland management agencies are concerned, there are only two kinds of fire: wildfires and prescribed fires. A wildfire is an unwanted fire that requires prompt suppression. A prescribed fire is one burning under specified and carefully controlled conditions that will accomplish certain planned objectives. Because of their role in the natural scheme of things, prescribed fires can be a “ R_x for Wilderness and Wildlife.” The article, by **E.M. “Sonny” Stiger** and **Beverly Stiger**, begins on page 14. Sonny Stiger is the zone fuels management specialist for the USDA Forest Service (FS), headquartered in Helena. Beverly Stiger has worked for the FS and the Bureau of Land Management in both Colorado and Montana.

• **The Rev. Ron Johnstad** shares what he’s learned about elk hunting, information gathered from two main sources: friends and experience. His friends have taught him that the more foul and fussy the weather, the better the odds of seeing an elk. Experience has taught him that “Stalking the ‘Mountain Ghost’ ” requires more than luck. Dr. Johnstad is senior pastor at Lutheran Church of the Good Shepherd in Billings and confesses that even a preacher is “pretty quiet” in elk country. His article begins on page 18.

Montana Outdoors expresses thanks to **Elmer Sprunger** for the front cover painting of two elk, done especially for this issue. Born in the Flathead, Sprunger works from his studio in Bigfork. He believes that preserving the environment is of utmost importance

and that wildlife painting is an expression of concern for the outdoors. He has had several one-man shows and his work is available from Flathead Lake Galleries, Bigfork; Ponderosa Gallery, Kalispell, and Kootenai Trading Post, Troy.

The illustrations appearing with Dr. Johnstad’s article are by **Charles Fritz**, Billings. Fritz has had several one-man shows and has two additional shows scheduled in 1982. For additional information about his work, contact Charles Fritz Sporting and Fine Art, P.O. Box 780, R.R. 9; Billings, MT 59101.

• Some folks have little or no regard for members of the pike family. **Ken Walcheck** isn’t one of them. As he writes: “I’ve hooked large pike that came in like waterlogged old shoes, but after getting close to the boat, they would tear away in long runs and soar out of the water with head-shaking, splayed-gill ferocity.” Turn to page 25 and “Water Wolf of the Weed Beds.” When he’s not adding to his storehouse of pike plugs, Walcheck is the information officer for the Miles City region.

Harvey Eckert’s pen and ink illustrates the northern pike article. No stranger to our pages, Eckert’s work has also appeared in many national publications. He now devotes full time to his art and operates Nature’s Shadow Studio at 2800 Gladstone; Butte, MT 59701.

• As **Jeanette Hortick** writes: “...the wood duck’s scientific name signifies ‘waterfowl in wedding raiment.’ ” Indeed, the “Iridescent Beauty” of this exquisite bird has won the admiration of naturalists, hunters and photographers the world over. For a profile of the wood duck, turn to page 30. Hortick was an intern at *MO* in summer 1980. She holds a B.A. in journalism/liberal arts from the University of Montana, Missoula. She is now living in Butte and working as a free-lance writer.

With his illustration of hen and drake wood ducks, we welcome the work of **Ralph Holmes**, Missoula. A part-time artist, Holmes works primarily in acrylics. He is employed by the Art Attic. His artistic perceptions are enhanced by his wildlife background, including a degree in wildlife science from UM.

• Special thanks to: **Bill McRae**, Fairfield, for his photograph on page 13, and **Vince Claerhout** of Pincher Creek, Alberta, for his back cover photo.

The Wood Duck: **IRIDESCENT BEAUTY**



by Jeanette Hortick
painting by Ralph Holmes

Aix sponsa, the wood duck's scientific name, signifies "waterfowl in wedding raiment." The iridescent beauty of this exquisite bird has won the admiration of naturalists, artists, hunters and photographers the world over, and it has been honored three times on stamps—the 1943 and 1974 Migratory Bird Hunting stamps, and a six-cent U.S. postage stamp minted in 1968. As with most members of the duck world, however, the wood duck drake's plumage is more spectacular than his bride's. Nonetheless, with her greyish iridescence, her white throat and white eye patch, she is a queen among female waterfowl.

"Woodies" are relatively small ducks, measuring about 17-20 inches long with a wingspan of about 28 inches. Drakes generally weigh about 1.5 pounds, while hens average slightly less at 1.4. Both sexes have a long, squarish tail and a crest on the head. The male has a clear whistle rather than a quack, while the female utters a catlike sound.

Although more common to the eastern United States, wood ducks are found nesting or, during migration, sometimes resting in Montana and other western states. The western breeding range extends from Washington to California, with the eastern limits in northern Idaho and northwestern Montana. They prefer woodland areas near water and usually nest in deciduous trees—often in abandoned squirrel holes, in cavities hollowed out by woodpeckers or inside broken limb stubs.

Wood ducks pair off on their wintering grounds in the southern states and California; then, as lengthening days signal the onset of spring migration, the female leads the male back to the area where she was hatched or where she nested the previous spring. After finding a place to nest, the drake perches on a branch, preens his feathers, woos his mate with love calls and watches for predators while his lady busily builds a nest.

Wood ducks are thought to be monogamous during the breeding

season, unless one mate dies. During mating, the drakes often engage in a brief but mild show of rivalry—chasing one another and losing a few feathers until the strongest prevails.

The hen and drake usually stay together until incubation. The hen lays from 10 to 15 dull-white or brownish eggs, usually one a day. Her mate waits while she lays each egg, which she covers with debris from the nest. They then fly off together, returning the following morning. After about the sixth egg is laid, the hen begins pulling feathers from her breast to place over the eggs for additional insulation when she leaves the nest.

Incubation, which begins after the last egg is laid, lasts about 30 days. The hen ordinarily leaves the nest twice each day during this period, once in the early morning and once in the late afternoon. She is usually accompanied by the male on these rest flights until the fourth week of incubation, when the drake deserts her for his postnuptial molt.

A day after the ducklings break out of their shells, the mother calls them to venture out of the nest and jump onto the ground or into the water. The little balls of fluff leave the nest—often descending 20 to 50 feet without injury—in rapid succession. The family then walks to the nearest water.

Hens prefer to rear their brood in watery areas with ample vegetative cover. Logs or muskrat houses are favored as resting spots during the day. Wood ducks are extremely wary of humans and other intruders, tending to shy away from open spaces. They swim in secluded areas and feed

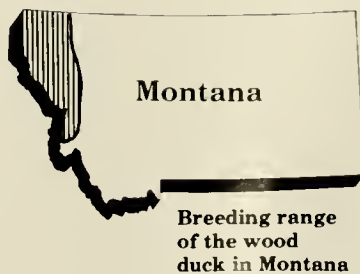
along shallow, grassy shores of lakes, ponds or sloughs. The wood duck's diet, consisting mainly of seeds, nuts and fruits, is supplemented with immature insects found both in water and on the forest floor. They will sometimes eat minnows, frogs and small salamanders.

After deserting the females, the drakes move to secluded ponds or swamps where they hide in thick vegetation and begin molting. The drakes lose their brilliant coats and are flightless for about two weeks. The females molt later than the males, about six to eight weeks after the young have hatched. Shortly after regaining flight, the young and adults begin to prepare for fall migration.

Studies have shown that approximately 50% of the ducklings that hatch will have succumbed to various forms of mortality by the time of fall migration. Minks, turtles, fish, snakes, bullfrogs, birds of prey and other predators all take their toll. Many predators will eat the eggs, but among the most serious are raccoons and snakes.

Early in the 20th century, it was feared the wood duck was headed for extinction. Swamp drainage and logging removed many of their nesting sites, and commercial gunners took a heavy toll. In 1918, the wood duck was placed under protection and, with sound conservation practices, it has gradually recovered. Today, it is once again a commonly seen bird, with huntable populations in all the flyways. Its recovery has been aided greatly by a program of nest box building.

The wood duck is an easy bird to identify, even in flight. The crest can be seen on both sexes at a considerable distance, as can the long, squared-off tail. Rapid, skillful fliers, wood ducks often fly with their heads turned slightly and their bills angled downward. In the water, they float lightly, with their tails well above the surface. It's easy to see how the admiration of naturalists, hunters and photographers has come the wood duck's way. ■



Botulism continued

Even though bacteria were recognized quite early as the source of botulism, just where these pesky critters set up housekeeping was, until recently, open to debate. Because botulism is frequently associated with shallow marshy areas that have recently flooded, or mud flats exposed by receding water, it was once felt that decaying vegetation, marsh debris and mud must be sources of the toxin. Botulism, however, frequently occurs in the absence of decaying vegetation or marsh debris. In fact, neither water nor mud is essential to the production of botulism. Yet, a marsh is essential if botulism is to kill hundreds of thousands of ducks at a sitting.

Work by biologists in California and Utah has pointed to land and water invertebrates plus flies and maggots as the primary, if not the sole, means by which waterfowl ingest botulism toxin. Water invertebrates include such common insects as mayflies, dragonflies, water scavenger beetles, water boatmen and backswimmers. Land invertebrates include beetles, cockroaches and a whole host of wee beasties commonly known to us as bugs. The flies and their maggot stage include the blowfly and flesh fly. Although many of these invertebrates do not regularly feed on bacteria cells, they do ingest them by chance. The end result is a potent package which waterfowl find highly palatable.

In an attempt to test many theories concerning botulism and waterfowl, the California Department of Fish and Game constructed experimental enclosed ponds at its Wildlife Investigation Laboratory near Sacramento. The idea was to produce conditions in the pond which would parallel as closely as possible those found in marshes infamous for botulism. Mallards were kept on the ponds to serve as indicators of the presence of botulism toxin. Water levels were carefully manipulated to simulate those found during botulism outbreaks. The results were consistent—no botulism. Botulism could be produced at will, however, simply by adding a dead duck carcass to the pond. Fly eggs laid on the carcass developed into maggots in the

decaying carcass, emerged, fell into the water, and were consumed by healthy mallards which subsequently contracted botulism and died. In the presence of maggots, healthy mallards or pheasants placed in the pond enclosure during mid-afternoon would be dead the following morning. It was not necessary that the carcass have died from botulism or that it even be placed in the water. Waterfowl workers elsewhere have been able to duplicate these results exactly.

To further illustrate the situation, botulism among pheasants in game farms has occurred after a pheasant was killed from flying into the wire of its cage. Maggots that developed on the decaying pheasant proved to be highly toxic—and actively sought after by other pheasants. In one such game farm outbreak in California, over 40,000 pheasants died. Other notable game farm losses have occurred in New York, Wisconsin and Ontario. In short, a decaying carcass produces an excellent microenvironment in which *Clostridium* can grow, reproduce and metabolize. The carcass is an abundant source of protein, relatively airless, and during summer months can easily reach the necessary temperature. Maggots which feed on the decaying carcass consume toxic bacteria and, though immune to the toxin themselves, become highly poisonous. Only three or four maggots are needed to kill the bird eating them, and a single carcass can produce upwards of 5,000 maggots!

While many invertebrates found on land and water may contain botulism toxin, it is not necessarily a common condition. As mentioned earlier, many invertebrates do not specifically feed on bacteria, but ingest them incidental to their foraging activities. Since botulism bacteria are not toxic unless they have had time to develop inside an airless source of decaying protein, live invertebrates are not toxic unless they pick up the bacteria while scavenging on carrion. This is best illustrated through work conducted at the Bear River Refuge in Utah, where researchers tested invertebrates that either were or were not found in association with decaying bird carcasses. Botulism toxin was

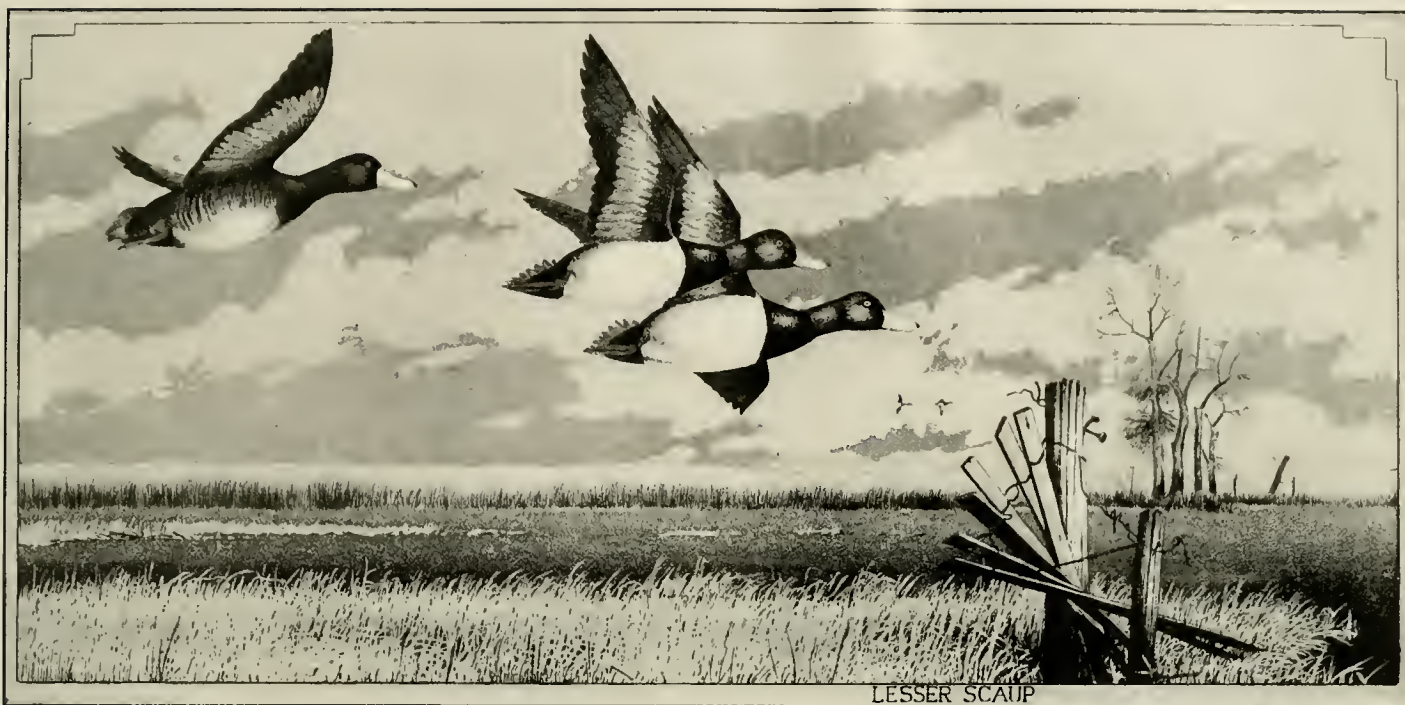
found in 43% of 461 invertebrates associated with decaying carcasses. None of the 237 invertebrates not associated with decaying carcasses contained botulism toxin.

Invertebrates that do not contain botulism bacteria in their digestive tracts at the time of death do not produce toxin. Those containing botulism at the time of death can become toxic only if the temperature is favorable.

The fact that botulism toxin can be produced in invertebrates following their demise is no doubt what led early workers to associate botulism with shallow marshy areas recently flooded, or moist mud flat areas left by receding water levels. As dry land rapidly floods, numerous land invertebrates die by drowning. Those invertebrates containing botulism bacteria at the time of death become a prime source of toxin for waterfowl drawn to the newly flooded areas. Because pintails are especially fond of such situations, they are excellent candidates for botulism poisoning under these circumstances. The reverse can happen as water levels fall. Aquatic invertebrates are stranded on mud flats and die. In either case, waterfowl that eat invertebrates containing toxin die from botulism and then themselves become a source of decaying protein upon which flies can lay eggs and perpetuate the cycle. This cycle continues until the source of decaying protein is gone or temperatures start to drop, generally in September.

In certain instances, botulism has reared its ugly head as soon as the ice has gone out in the spring, long before optimum temperatures for botulism have been reached. Research has shown that toxic invertebrates which die in the fall can maintain high levels of toxicity for as long as seven months—certainly long enough to carry the toxin through the winter and have it waiting for spring migration flights.

What then, constitute ideal conditions for a botulism outbreak? Perhaps the worst situation is a temporary, shallow, gently sloping impoundment whose water level fluctuates considerably over a wide area, resulting in large numbers of dead invertebrate carcasses in a short time period. Permanent, steep-sided,



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stable-level impoundments are least likely to present problems. Some states have developed such impoundments on waterfowl management areas by constructing steep-sided dikes and levees to maintain a constant source of relatively deep water. To do this also requires the ability to add water to certain ponds or to periodically drain other ponds. On many of the large marshes and alkali basins of the West, however, this has not been done because of the high cost and lack of control over the water source.

Is there a solution to the botulism problem? Because dead animal matter is necessary for the production of botulism toxin, the solution is obvious—prevent animals from dying and you have prevented botulism. Unfortunately, since this ability does not rank among man's many noble achievements, we must be satisfied with trying to maintain botulism at acceptable levels.

Once a botulism outbreak occurs, there are several means of attempting to minimize losses, some of which bear a striking resemblance to World War III. Waterfowl can be moved from an infected area with air boats, scare guns, rockets and firecrackers dropped from helicopters. By nature, ducks are highly mobile and a certain amount of success can be had if there are botulism-free areas nearby. Unfortunately, the shallow water

areas that are generally the most toxic are also favored by resting and feeding waterfowl.

Surveillance of known botulism-producing areas can help detect outbreaks in their early stages. At this point, picking up dead carcasses can go a long way toward reducing losses. This is a time-consuming and expensive operation, but can save large numbers of birds by breaking the dead carcass-toxic maggot cycle.

Where does Montana fit into this gruesome picture of death and destruction? In the past we have been well below other western states in the number of botulism losses. Regrettably, however, in recent years the picture has grown much worse. During the past three summers (1978-80), in the Central Flyway portion of Montana, an estimated 107,590 waterfowl were lost to botulism. These are probably minimum figures, since detailed observations have been made on only four bodies of water in the state: Big Lake near Molt, Bowdoin National Wildlife Refuge near Malta, Broadview Marsh near Broadview and Medicine Lake National Wildlife Refuge near Medicine Lake. Of the 107,590 recorded birds lost, over 86% came from the Big Lake and Broadview Marsh areas. Although these losses included some species of limited sporting value, such as coots, their magnitude becomes apparent when

compared with total duck kills for the Central Flyway in Montana. For example, the hunter harvest in 1978 was 54,851 ducks—only slightly more than the 50,000 birds lost to botulism in that year. In 1979, hunters accounted for 73,126 ducks, compared with 50,250 birds lost to botulism. For those two years alone, the waterfowl loss to botulism amounted to 78% of the Central Flyway harvest in Montana, and never a shot was fired!

Harvest figures are not yet completed for 1980, but botulism losses were substantially lower, with only 7,340 birds recorded. A great deal of this reduction was due to a season-long carcass pickup program conducted by the U.S. Fish and Wildlife Service on the Broadview Marsh.

What are the chances for controlling botulism in the future? Research efforts are still concentrating on cause and effect relationships that must be understood before any dramatic improvements can be made. These include, among others, the relationship of invertebrate populations to botulism outbreaks. For the present, however, surveillance, carcass pickup programs and water level management where possible appear to be our best bets. All in all, this isn't really so bad when you consider that for the first couple of million years of man's association with avian botulism, we didn't even know its name. ■



For 40 pages of color photos underscoring
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